JUNIOR MECHANICS AND

MODEL AIRPLANE NEWS

JULY

Starting in this issue

GLIDING AND SOARING

By PERCIVAL WHITE

This Thrilling Sport Absorbingly Described in Detail

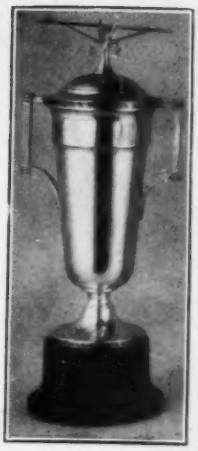
SPECIAL COURSE IN AIR NAVIGATION

By Capt. LESLIE S. POTTER

The Mainstay of Successful Piloting

$1000 IN PRIZES - 165 AWARDS - HONOR CERTIFICATES

WIN SILVER TROPHY AND $100 IN GOLD



BOYS, here's the biggest opportunity you ever had to win $100 in GOLD, a handsome aviation trophy 18 in. high and national wide fame as a champion model builder. $1,000 distributed in 165 awards. And the contest is so planned you can win as many as 5 different awards!

You do not have to be an exceptional model builder. You do not need great skill nor experience. We reward the patient, steady builder—not a freak flight performance no one else can duplicate. You have as good a chance as anyone to win the GRAND GOLD PRIZE of $100, the 18 in. Silver Aviation Trophy engraved with your name—value $50—and country-wide recognition of your ability. Besides the prize awards, every qualifying entry is awarded an Honor Certificate.

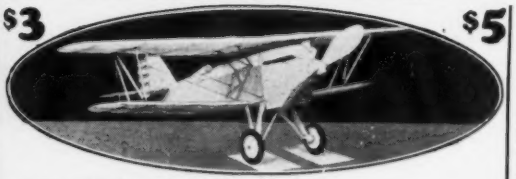
$1000 IN PRIZES

Wear the Wings of a Pilot

Upon enrolling you receive cadet's identification card. Complete your model and send in a report. You then are licensed PILOT and awarded your wings. From pilot you advance to Flight Commander, Squadron Commander and the winner of the Grand Prize will be known as Champion's Ace for 1931. Talk about fun! Talk about thrills! There's nothing in model aviation equal to it for developing your knowledge of flying. Champion models are new scale-type, flight-tested reproductions of real airplanes. Even if you do not wish to compete, you will get loads of fun building and flying these realistic models. U. S. Navy specification airplane balsa and Champion's new rubber motor—developing 10 percent more power than commercial rubber threads—supplied in all kits.

Prizes awarded on basis of workmanship as well as flight. Only Champion kits eligible. 10 classes in which to compete. Entries are to be signed by responsible person. Period prizes in addition to grand prizes when there are 10 entries in a class. Judges' decision final. Duplicate awards in case of ties. Rules, regulations, 32-page catalog, cadet identification card and flying button included free with orders, otherwise send 10c. The earlier you start the better your opportunity to win. So order your kit NOW!

$3



$5

Wins District Prize with this Colored Scale-type Hawk

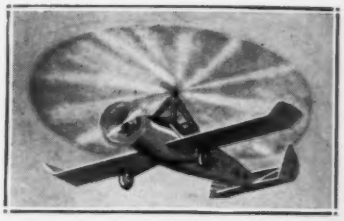
Detroit, Mich., modelbuilder wins district contest with this Curtiss Hawk kit. Realistic reproduction of Uncle Sam's fast-stepping pursuit ship. Celluloid wheels, streamlined headrest, imitation exhausts, synchronized machine guns, staggered adjustable wings. Army insignia in colors, detailed full size blueprints, compete construction kit.

To be covered with yellow and olive drab tissue. Can. postpaid $3.30. U. S. postpaid..... **$3**

To be covered with thistledown weight silk, genuine Hawk olive drab and yellow dopes thinned. Can. postpaid $5.50. U. S. postpaid..... **$5**

West of Denver \$1.00 extra for postage

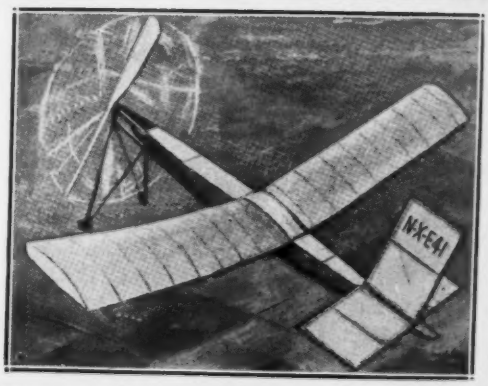
NEW THRILLS for YOU FLY This AUTOGIRO



Fanning windmill revolves by autogiro principle and creates lift. Front prop rubber powered. Fuselage and stabilizing wing built from balsa and tissue same as any flying model. A great type with which to experiment. Learn how the autogiro flies through this most educational and thrilling model. Blueprints, directions, U. S. Navy Specification balsa, Champion rubber, everything complete in kit form. Can. postpaid $2.20. U. S. postpaid..... **$2**

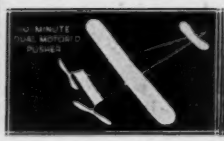
FULL SIZE PROFESSIONAL BLUEPRINTS FURNISHED WITH KITS

WIN OUTDOOR CONTESTS WITH THE 4-FOOT N-X-E41



Model clubs and winners of contests are buying the N-X-E41 to develop better flight records. Easy to construct. Easy to fly. On our own proving ground, the N-X-E41 rose after a 2-foot run and grabbed altitude like an autogiro. This type has 41-minute record made by gaining 500 feet or more altitude, then duration by flat glide and wind currents. 4-foot wingspread yet weighs only 2 oz. Maximum cross section to quality for A.M.L.A., Playground Association, or Wakefield (England) rules for contests. 20-ft. Champion's new rubber, turning 16-inch prop. Full size blueprints prepared by professional draftsman. Here is a real prize-winning design and kit, all complete, postpaid Can. $3.30. U. S. postpaid..... **$3**

USE COUPON ON NEXT PAGE TO ORDER THESE MODELS



Featherweight, 40 in. special high-lift twin-pusher that floats on air with slow turning props which spiral the plane to great heights and big records. Complete with all materials, full size blue prints, directions, postpaid Canada $3.30. U. S. postpaid..... **$3**

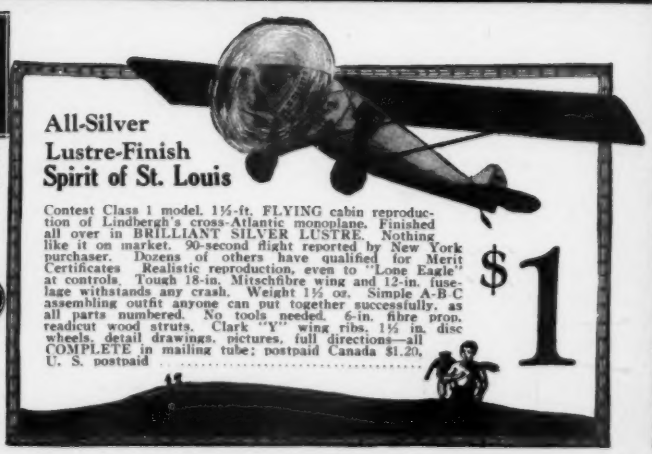
Nothing quite equals the thrill of seeing a hydroplane lift from the water and go circling away, water dripping from its pontoons. Here's the big outdoor type that has flown for 12 1-2 minutes. All complete with full size blueprints, etc. Canada $3.30. U. S. postpaid **$3**

SKEETERBUG HYDROPLANE

Big sport flying it from creek, river lake or tank. Takes off and lands on water successfully. Can. postpaid $1.20. U. S. postpaid.. **$1**

INDOOR RECORD SMASHER

The type that has flown over 400 seconds at the Detroit meet, winning prizes and awards running into hundreds of dollars. Canada postpaid $1.20. Postpaid U.S. **$1**



All-Silver Lustre-Finish Spirit of St. Louis

Contest Class 1 model. 1½-ft. FLYING cabin reproduction of Lindbergh's cross-Atlantic monoplane. Finished all over in BRILLIANT SILVER LUSTRE. Nothing like it on market. 90-second flight reported by New York purchaser. Dozens of others have qualified for Merit Certificates. Realistic reproduction, even to "Lone Eagle" at controls. Tough 18-in. Mitschfibre wing and 12-in. fuselage withstands any crash. Weight 1½ oz. Simple A-B-C assembling outfit anyone can put together successfully, as all parts numbered. No tools needed. 6-in. fibre prop, readicut wood struts. Clark "Y" wing ribs, 1½ in. disc wheels, detail drawings, pictures, full directions—all COMPLETE in mailing tube; postpaid Canada $1.20, U. S. postpaid..... **$1**

$1000 IN PRIZES - 165 AWARDS - HONOR CERTIFICATES - $1000 IN PRIZES

FLY Admiral BYRD's "STARS and STRIPES"

FAMOUS FOLDING WING FAIRCHILD 71

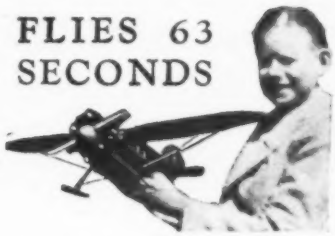
THREE MODELS IN ONE

NEW KITS Including Insignia Balsa Prop. Framing Readient

Here's a Class 1 Contest model. The famous "Stars and Stripes" used by Admiral Byrd for all his survey and aerial photography work at the South Pole. Now you can have a 2-foot COLORED Scale-type flying model of this famous plane, FOLDING WINGS and all, workable doors, cellophane windows, all insignia, pontoons, skis, wheels, to fly r. o. g., r. o. w., or r. o. s. (rise off snow). Wings adjustable as well as folding, so centers of pressure and gravity will coincide and assure long stable flights. Eye-arresting model with its neat lines, orange and black-trimmed fuselage. "I get constant flights of 300 to 400 feet" writes Bruce Glassfold, Walkerville, Can. "My Fairchild flies as smooth and steady as the real plane. Any beginner can build a satisfactory model from your kits," says Howard Doolittle, Southington, Conn. "Several of my friends have built your models and have had better results with them than any others they made," mentions Ross Goodwin, Chicago, when sending in a double order. "I sure think it's a keen plane," says Clifford Gilmore, Everett, Wash. Wing span—24". Chord—3 5/8". Length—17 1/2". Height—6". Wt.—¾ oz. Champion's new rubber motor, balsa framing readicut, stamped wing ribs and bulkheads, glue, dope, bamboo, fittings formed, finished balsa prop, prop block, full-size professional blueprint, directions, complete in stout mailing tube, $5 value sold direct to you, postpaid Can. $2.20, U. S. postpaid . . .

WINGS FOLD BACK like those on REAL FAIRCHILD

$2



FLIES 63 SECONDS

Wheeling, W. Va., March 8, 1930.

Gentlemen

Everything arrived safe. Boy! They sure are good airplanes. Mother said that it wasn't worth anything if it's only $2. But now she's said it's better than the one I bought for $4.98. It flew for 50 sec. r. o. g. Hand launched 1 min. 3 sec. before it hit a wire and pulled the wing off.

Yours,

V. Szeligo.

LINDBERGH'S New Coast to Coast RECORD BREAKER LOCKHEED "DOG STAR"

Scaled Direct from Drawings Furnished by Manufacturers

Every important detail of LINDBERGH'S Transcontinental Record Breaker has been reproduced in this flying Lockheed Sirius or "Dog Star" plane. Streamlined pants, gold-and-orange pin striping, brilliant black fuselage and orange-red wings. Even the Lockheed trademark and Lindy's famous license number "NR-211" furnished in all kits. N. A. C. A. cowling gives it a speedy, racy line. Using Champion's featherweight construction methods, you should obtain unusual duration. It is the hottest model for 1930 and you will be the envy of every boy who sees it. Get one now.

De Luxe Kit

Brown celluloid pants, lighter than balsa. Celluloid cowling, windshields, leather-trimmed cockpits with original instrument panel installations reproduced. Rubber-tired wheels. Hand-carved standard pitch 14-in. balsa prop. Ball-bearing shaft. Landing gear attaches to wing, so it can be adjusted for correct flight. Wing span 4 feet. Covered with imported thistledown-weight silk. Canada and west of Denver postpaid $10.50. U. S. postpaid **$10**

Same as above but colored tissue in place of silk. Balsa cowling, pants. Celluloid wheels, windshields. 4-foot wing span. Can. and west of Denver, postpaid $5.50. U. S. postpaid.... **$5**

2-Foot Kit

2-foot model with formed balsa prop, balsa pants shaped, celluloid wheels, windshields, stamped ribs, full-size, blue print and complete directions, Champion's new rubber motor developing 10 percent more power, U. S. Navy Specification balsa, orange-and-gold striping, insignia, black-and-orange-red colored tissue, everything you need to make a scale-type flying model of remarkable duration. Can. postpaid $2.20. U.S. postpaid **$2**

32 PAGE ILLUSTRATED CATALOG, showing new models developed by our engineer after attending the International Aircraft exposition. Champion does not offer any fast-flying, over-powered type models whose support in the air depends on excessive speed. Every Champion model flies by wing lift and not an over-powered prop. Real scientific methods of construction employed. Cat., rules of $1000 Contest, cadet identification card, and flying button, free with orders from this advertisement. Otherwise send..... **10c**

Tear Out—Mail Right Away

Be the First to Fly These New Models

All kits and supplies guaranteed to satisfy, or for any reason within 5 days may be returned and your money refunded.

CHAMPION MODEL AIRCRAFT SUPPLY,
1510 Atlas Building, Columbus, Ohio.

Gentlemen. I enclose $.....for which send me, right away Model kits I have checked below:

- ☐ Fairchild Folding Wing.. $2
- ☐ N-X-E41..... $3
- ☐ Indoor Hydroplane..... $1
- ☐ Indoor Record Holder... $1
- ☐ Spirit of St. Louis..... $1
- ☐ Curtiss Hawk..... $3
- ☐ Curtiss Hawk Silk Covered..... $5
- ☐ Lindbergh Folding Wing.. $2
- ☐ N-X-E41..... $3
- ☐ Indoor Hydroplane..... $1
- ☐ Indoor Record Holder... $1
- ☐ Spirit of St. Louis..... $1
- ☐ Curtiss Hawk..... $3
- ☐ Curtiss Hawk Silk Covered..... $5
- ☐ Lindbergh Lockheed Deluxe..... $10
- ☐ Lindbergh Lockheed... $ 5
- ☐ Lindbergh Lockheed 2-ft. $ 2
- ☐ Auto Giro..... $ 2
- ☐ Outdoor Twin Pusher... $ 3
- ☐ Outdoor Hydroplane... $ 3
- ☐ Catalog, Contest Enrollment..... 10c

Included extra for postage.....

Name.....

Address.....

City and State.....

Please write plainly.

Guaranteed to Satisfy—Or Money Back

Vol. III No. 1

JUNIOR MECHANICS and MODEL AIRPLANE NEWS

CONTENTS, JULY, 1930

In Our Next Issue

Another wonder article on "*Gliding and Soaring*," by Percival and M. White, the two noted aeronautical authorities. Success is assured for anyone who studies assiduously this great course in America's newest and most thrilling sport.

—o—

Also another illuminating chapter of Capt. Leslie S. Potter's *Special Course in Aerial Navigation*, which forms a mainstay to successful piloting.

—o—

Then there is the opening chapters of "*Prisoner of the Air*," by Lieut. H. B. Miller. Those who read Lieut. Miller's "*The Air Goin' Navy*" will relish his new story of a skirmish between a Marine Corps Flyer and Sandino's rebels in Nicaragua.

—o—

Next month's plans include full-size drawings for a 2-ft. flying scale model of a de Haviland "Moth," one of the world's outstanding light planes, in which several altitude and long-distance records have been created.

There also are plans for a Smoke Screen model by Bob McCorkle, whose Navy Fighter model created such a furore.

—o—

Don't fail to obtain your August MODEL AIRPLANE NEWS. It is a gem in every respect, and only costs you 15 cents a copy.

On all news stands July 23rd next.

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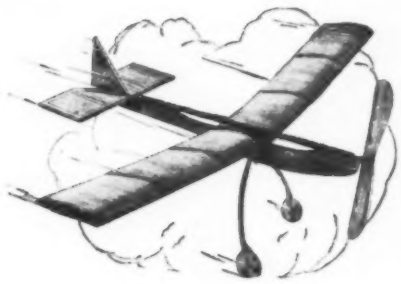
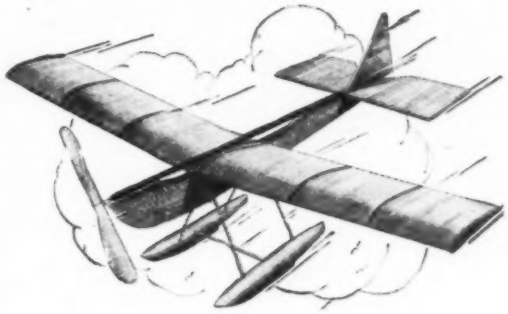
For Summer Sport

Build and Fly these NEW IDEAL *Featherweight* Models!



The Latest Development in Light-weight, Long Flying Model Airplanes

Simplified Advanced Design . . . all Balsawood Construction . . . Adjustable, Built-up Wings with Ready-formed Ribs . . . Adequate power for Long Flights . . . Formed Balsawood Propellers with Slowspeed Pitch . . . Easy and Rapid Construction . . . these and other IDEAL features place these Models in a class by themselves. Build and Fly them this summer!



The IDEAL "HORNET"

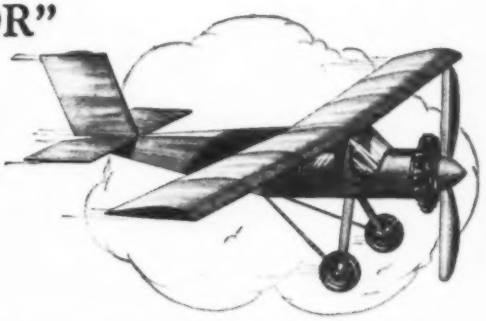
A sensational, 16 in. Flyer that weighs only ¼ oz. Has more power for its weight than anything in the air. Balsawood construction, built-up wings with formed ribs, shaped balsawood propeller. Easy to construct.

Construction Set..... 50c

The IDEAL "CONDOR"

Wing Span: 22 in. Weight: ¾ oz. Another featherweight model of snappy design and surprisingly strong construction. Ample power for record flights. Adjustable wings permit experiments under various flight conditions. Built-up wings with formed ribs; shaped balsawood propeller. Simple construction.

Construction Set..... $1.00



The IDEAL "AMERICAN EAGLE"

Wing Span: 26 in. Weight: 3¼ oz. A beautiful, low-wing, fuselage job. The special pitch, strong fiber propeller is practically unbreakable. Constructed with aluminum bulkheads, built-up, double-surface wings with ready-formed ribs, removable tail assembly. Motor can be machine wound without removing rubber from the fuselage. All parts ready for quick assembly.

Construction Set $2.50

The IDEAL "ROBIN"

The Newest Addition to the Ideal Squadron! Wing Span: 24 in. Weight: 3 oz. A wonderful fuselage job; one of the best looking we ever made. Demountable, adjustable wings; shaped balsawood propeller; large size landing wheels; dummy motor; plenty of power for long fast flights. Construction Set is complete with everything required.

Construction Set.... $3.50

Big Catalog Models, Parts, Supplies

Contains complete information about all IDEAL Model Airplanes and lists parts, supplies, materials and fittings needed by every model builder. Sent anywhere for 5c.

Ask Your Dealer for IDEAL Model Airplanes, or Send Your Order Direct. Satisfaction Guaranteed.

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The Most Reliable Name in Model Airplanes for 20 Years

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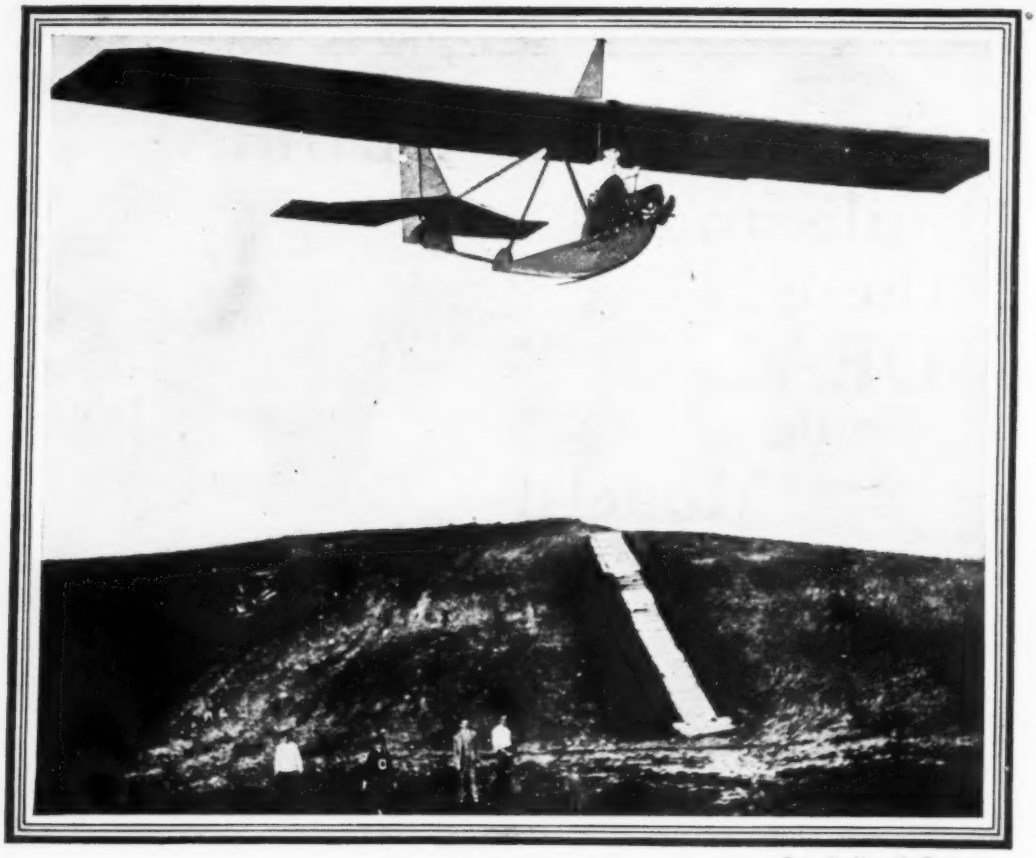


Detroit Aircraft Corp.

An interesting view of a glider flying straight ahead without allowing one wing to drop below the level of the other. At the same time, it is gliding downward gently

GLIDING and SOARING

This Thrilling Sport Described in Detail

IN this issue the editor of MODEL AIRPLANE NEWS *presents the first instalment of the long-heralded series on Gliders and Gliding. This series, to be published in book form by the McGraw-Hill Book Company, is the first complete treatise on this subject in the English language.*

The authors have obtained the material for these articles from all the most authoritative and up-to-date sources.

Percival White is well known as a writer. He has brought out many books on technical and semi-technical subjects, (such as "How to Fly an Airplane", published by Harper and Brothers). M. White, the co-author, has collaborated with Percival White in the writing of some of his previous works.

Chapter I

WHY YOU SHOULD LEARN TO GLIDE

MAN has always longed for the "wings of a dove". Wings he has at last found. In a glider, he can poise almost motionless in the air, or swoop downward like a bird upon his prey. Unlike the airplane, the motorless ship travels silently. A flock of sea gulls once joined a soaring glider, and flew in formation with it, thinking it was kin to them.

Advantage of a Glider. The glider has numerous advantages: In the first place, it is safe. Its speed is ordinarily so low, that, like a wind-blown leaf, it sinks to the ground very, very gently. See sketch p. 7. In consequence, the accidents which have occurred in well-built gliders are negligible. Moreover, gliders are comparatively inexpensive. One can be built at a cost of about $100 for materials, and purchased complete for less than $500. Gliders can be flown wherever the terrain is undulating. Even over perfectly flat country, gliders can be towed behind automobiles or motor-cycles. Gliders may also be towed behind motor-boats.

Gliding as a Sport. Until recently, gliders have been used mainly for pleasure purposes. It is more exhilarating to slide along above the surface of the earth in a glider than it is to coast down hill on a sled. The pilot controlling a glider, which does some prank with every gust of air, feels greater mastery than does even the driver of an automobile or the rider of a spirited horse. Because gliding is an incomparable sport, thousands of people in Europe and in America have become its devotees.

Gliding as a Means of Flight Training. Aside from its value as a sport, gliding has numerous and practical

A Manual of Motorless Flight

By PERCIVAL WHITE

Author of

"How to Fly an Airplane"

and

M. WHITE

applications. It is especially useful as a preliminary step in the training of pilots for motored planes. In this capacity, it will, doubtless, come into extensive use. The controls of an airplane are so similar to those of a glider that an accomplished glider pilot is able to handle the stick and rudder-bar of an airplane instinctively after an hour or two of motored flight.

Boys who are too young to handle high-powered planes, and would-be pilots, for whom airplanes are too expensive a luxury, can do no better than to begin their flight training by learning to glide.

Gliding as a Method of Studying the Wind. Comparatively little is yet known about air currents. Even powerful airplanes must be wary of storms, of unexpected gusts of wind, and of the sharp upward and downward currents of air caused by mountains and by inequalities of temperature.

The airplane is driven in one direction by its engine, and is, therefore, racked by the force of a wind current which is apt to blow in quite another direction. The glider, on the other hand, instead of flying at cross purposes to the wind, makes use of it as a motive and sustaining power. Because of its light weight, slow speed, and finer aerodynamic design, the glider is sensitive to every "bump" and gust of air.

Consequently, the glider pilot, with all outdoors as his laboratory, is rapidly perfecting the science of the wind. He is able to discover the effect of the various terrains upon the wind currents, and how his tiny ship can utilize these currents. There is nothing to prevent the glider-trained airplane pilot, caught in a storm or over mountainous regions, to cut out his engine and fly his plane as though it were a glider. Thus, gliding can be used as a means to safer and more expert aviation.

Potentialities of the Glider. Although gliders were invented long before motored planes, comparatively little has yet been done to make them useful. Countless uses will, no doubt, be found for gliders in the course of the next few years.

There are several methods by which auxiliary power may be applied to gliders. Since they are light, it is possible for them to traverse long distances above the ground, while losing altitude very slowly. For instance, an airplane, if its engine is cut out at an altitude of 5,000 feet, can normally glide for approximately five miles before landing; an advanced type of glider, from the same height, is able to glide several times that distance. Therefore, if the glider were supplied with some reliable means by which it could gain height, without measurably increasing its weight, it could travel for miles without an engine.

Experiments have been made in which gliders were equipped with light airplane engines. Other gliders have been shot into the air with rockets. It has even been found possible to launch gliders from a dirigible, and this offers some interesting possibilities.

Gliders have also been towed behind an airplane, as a train of cars is drawn by a locomotive. It has been suggested that two strings of gliders be attached to the airplane, so that when in the air, they would fly in V-formation. The gliders would cut loose before starting their glide to the ground, to avoid collision with the motored plane. It has been suggested that small gliders be carried in transport planes as lifeboats.

Gliding has already served well the sport-loving and scientific Germans. It may safely be predicted that Americans may also consider it a science and a means of education worthy to supplement motored aviation.

Chapter II

HOW YOU ARE TAUGHT TO GLIDE

Nat'l Glider Association

The controls are plainly seen here. The rudder, bar and stick are connected by wires with the control surfaces (rudder, elevators and ailerons) which direct the glider's movements

BEFORE you start to glide, you should obtain a clear understanding of the steps in the training which you are about to undergo. You should decide upon the form of instruction which is most suitable and, at the same time, available to you; and you should have a general idea of all the steps in instruction which are described in detail in this series of articles.

Self-Instruction. There are, in general, three forms of training: self-instruction, schools, and clubs. Before gliding began to be organized as a sport, every man built his

The pilot (above) is pictured using rudder and bank to effect a turn. The glider is banked to the right; i.e., the right wing is lower than the left in order to offset centrifugal force in a right turn. Photographed to the right is the latest development in the scope of motorless aviation. Lieut. R. S. Barnaby is shown in the glider at the moment of taking off from the dirigible Los Angeles

U. S. Navy official photograph

own glider and taught himself to fly it. This was doubly dangerous, since the design of his ship was, more often than not, aerodynamically imperfect, and since the pilot, inexperienced in the control of his glider, was apt to lose his balance when in the air.

Therefore, unless you have a glider which has been thoroughly tested by an expert, and unless you are already an accomplished motored plane pilot, your one wise course would be to obtain instruction from a qualified teacher.

Schools. One good way to obtain such instruction is to go to a glider school. Such schools are of two types: those where gliding alone is taught, and those flight schools which make use of training in motorless ships merely as a preliminary step to dual instruction in an airplane.

Schools where gliding alone is taught are still few in this country. A camp at Wellfleet on Cape Cod, established in 1928, lays claim to being the first institution of its kind in the United States. Since that time, a few other gliding schools have been founded. At some universities, too, it is possible to obtain motorless flight training.

Those schools where gliding is used to complement power plane training are rapidly becoming more numerous. Such schools provide ground training for their pupils, as well as actual practice in the air. Doubtless, most flight training courses will eventually be combined glider and airplane courses, as they are in Germany, where an aviator's license presupposes a certain amount of glider experience.

No matter which of these types of school you choose, you are comparatively sure to find well-built ships and instructors who are both good pilots and good teachers.

Clubs. At present, the commonest way of learning to glide is through a club. Here, you will find an organization of real sportsmen, who have rented a gliding field, bought one or more ships, and secured an instructor.

Many communities in this country have terrain suitable for gliding purposes. The field may well consist of a knoll, sloping in all directions, or, if this is not available, a gentle slope, free from obstructions, and facing into the prevailing wind of the region. In perfectly flat sections, gliders must rely upon automobiles, motor-cycles, or motor-boats for taking off. For beginners, touring behind motor vehicles is not suitable. They may, perhaps, have recourse to levees, dams, or artificial hills. With automobile transportation as it is today, a distance of 100 miles or so is not prohibitive. Hence, there need be no section devoid of its glider field.

Chains of hills, 150 feet or more in height, are necessary for soaring. Soaring can also be done along the seacoast, or at the edge of a lake, where upward currents are plentiful.

Some clubs build their own ships, but this is inadvisable unless at least one of the members is thoroughly versed in the construction of planes. To do this, however, is usually unnecessary, since the cost (to each member) of a factory-built glider is comparatively slight.

J. P. Schroeter, consulting engineer, and Technical Director of the Glider Club of Wisconsin, says:

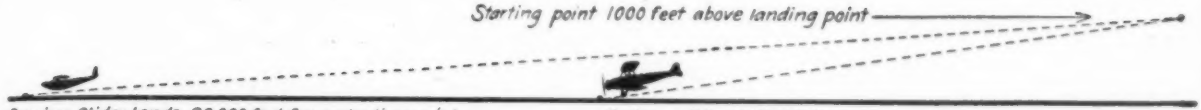
"My experience in our club has demonstrated that it is of the greatest importance for the boys to build their own gliders. They learn so much in this work that, even with no practical gliding experience, they get out of their club activities the greatest benefit. We further found that none of the factory-built gliders can compare with ours in workmanship. The necessity of repairs after many glides is easily accomplished if the boys know all details of construction. Of course, it is essential that good construction plans are available and that somebody can read and interpret them. Where there are not such boys or men, it is better to postpone any activity until they are found."

CLUBS of from fifteen to thirty members can usually afford only one glider, although it is always desirable to have more, since one is apt to spend too much of its time being repaired. But if the members are very ardent flyers, with a good deal of time at their disposal, or if the organization has more than thirty associates, the club should have more than one glider. Ships for advanced training will also be required, when the proper time comes.

Clubs should, if possible, provide hangars for their ships. A glider which is left outdoors, even if it is staked and weighted to the ground, may suffer severely from ravages of the wind and weather. Some gliders can be folded, without too much effort, for garaging.

A club should take great care in selecting its instructor. He must not only be an able flyer, but he must also have the ability to impart his knowledge to his students. When all the members have learned the fundamentals of gliding, the instructor is no longer indispensable; but, although many people attempt to do so and are still doing so successfully, it is wisest not to take the first steps in flight without direction. Too much reliance should not, of course, be put on others. The greatest lesson the glider can teach a boy is to depend on himself.

Preliminary Knowledge. When you have decided upon



the form of training which you are to pursue, you will actually begin to glide. You should not, however, go into the air without some knowledge of aviation. You should know why it is that the glider stays in the air, what uses the various parts of the ship have, and how its various maneuvers in the air are effected. Such preliminary knowledge will help you understand the instructor's directions, which are of necessity comparatively brief, and it will shorten the time which your early training in the air will require.

There are, in general, three ways in which you can obtain some information about gliding before beginning actual flight:

First, you can read some general textbook on gliding. Information gleaned in this way will help you understand more readily the directions given you by the instructor.

Second, you can add to the facility with which you learn to fly by ground training. Ground training consists of actual construction and repair work on ships, and of the study of various scientific subjects; principally aerodynamics, or the study of forces which support the glider in the air, and meteorology, or the study of the wind and the weather. The importance of such theoretical knowledge cannot be overestimated. Just as a knowledge of harmony is essential to the musician, so is a knowledge of aerodynamics and meteorology essential to the pilot. The most successful soarer pilots have been engineers or engineering students. You can obtain such ground training by experimenting and reading, either by yourself, at an aviation school, or under the direction of an expert pilot.

Third, you can acquire information before taking off by sitting in the glider while it is on the ground and moving the stick and rudder-bar about. If the ship is headed into a low wind, the ailerons, rudder, and elevators will take enough effect for you to grow accustomed to the plane's response to the control movements. In some schools, artificial winds, blowing upon the glider from different directions, are provided by propellers. Any such plan as this has distinct limitations, for it cannot give any grasp of the essential theory of flight.

Parts of the Glider. The parts of the glider can be classified under four headings:

1. Fuselage
2. Supporting surfaces
3. Undercarriage
4. Controls.

The fuselage is the body of the ship. To it are attached the wings and the tail group of controls. In primary training gliders, the student's body is purposely left open to the air, that he may the better get its "feel", but advanced ships have cockpits. The cockpit is contained in the nose of the fuselage.

The supporting surfaces are the wings. They extend from either side of the fuselage, much like the wings of motored airplanes. The ailerons are fastened to the trailing edges of the wings.

THE undercarriage is that part on which the glider rests on the ground. It consists usually of a skid, which is flexible enough to absorb the shock of landing. Sometimes small wheels form the undercarriage, but they add somewhat to the weight of the plane and even more to its resistance to the air. They are considered obsolete, except for gliders which are tow-started.

The controls are nearly flat fin-like surfaces hinged to the glider, which, when swung back and forth, direct the ship's movements in the air. These controls are called the rudder, the elevators, and the ailerons. The rudder, like a ship's rudder, is attached to the glider in a vertical position, and acts to swing the nose of the plane to the right or left.

The elevators are two horizontal fins, which move as a single unit. (Sometimes they are designed as a single unit.) They turn the nose up or down, causing the ship to climb or dive. The rudder and the elevators are fastened to the rear end of the fuselage, and are called the tail group.

The ailerons are two horizontal surfaces hinged to the trailing edges of the wings. When one aileron goes up, the other goes down. They effect the rolling movement of the ship. That is, they depress one wing, so that the ship leans to one side, forming an angle with the horizon. This tilting of the ship is called *banking*.

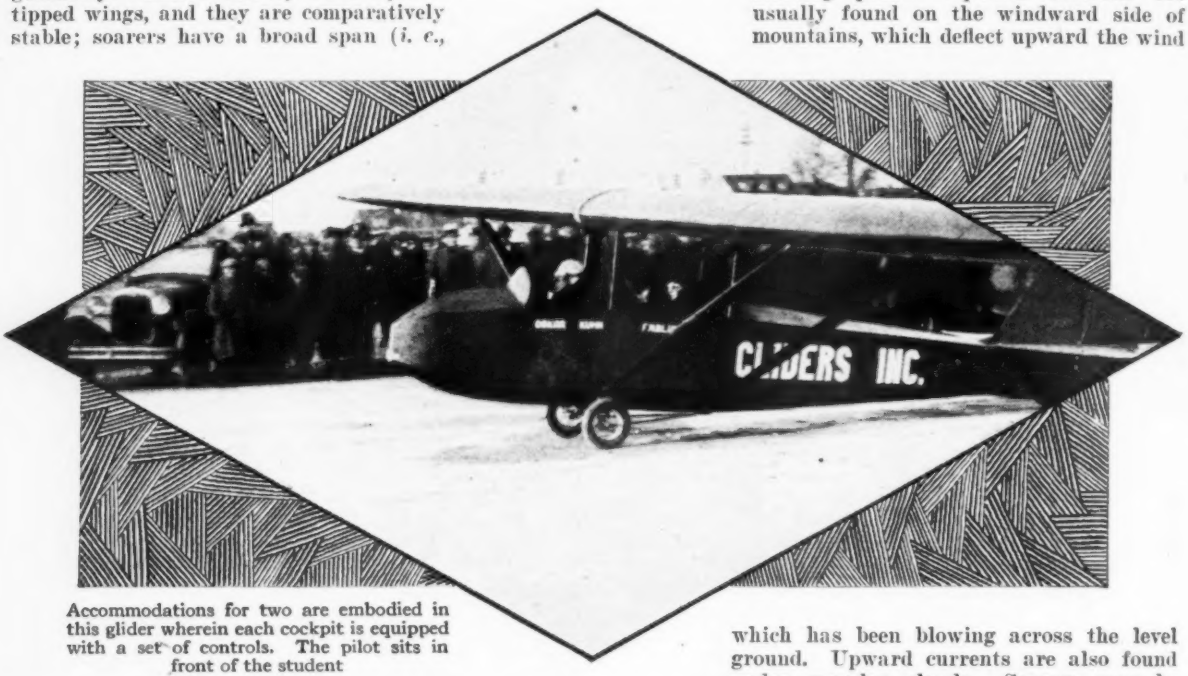
Detroit Aircraft Corporation

Curtiss Flying Service

In this scene of a take-off (above), the rubber shock cord, which works in the manner of a sling-shot, is tardy about falling off the glider's nose and has begun to pull the ship down again. (Left) This glider is built with a water-tight hull so that it will take off from and land on water. Mr. Glenn H. Curtiss, builder of the ship and one of the pioneers of aviation, is shown in the cockpit

Stick and Rudder Bar. The movements of the controls are effected by the pilot from his seat. The ailerons and elevators are connected with the stick by cables, and the rudder is connected with rudder-bar. The pilot moves the stick with his hand, and the rudder-bar with his feet.

Types of Planes. Since mass production of gliders is not yet general, types of gliders are still heterogeneous. Some rough classifications may, however, be made. First, there is a distinction between gliders and soarers, although the two types often merge indistinguishably. Gliders usually have square-tipped wings, and they are comparatively stable; soarers have a broad span (*i. e.*, great length from one wing tip to the other), tapered wings tips, and they are sensitive to every current of air.



Accommodations for two are embodied in this glider wherein each cockpit is equipped with a set of controls. The pilot sits in front of the student

Primary training gliders, with open seats, are already fairly well standardized. Secondary training gliders, with enclosed cockpits, are becoming standardized. Soarers are of countless different designs.

Gliders may also be classified according to the number of wing surfaces: as monoplanes, biplanes, triplanes, etc. Most gliders are monoplanes. The wings of biplanes are usually placed one above the other; but some ships have occasionally been made in which the supporting surfaces were set one behind the other.

Motorless planes may also be divided into hang-gliders and sit-gliders. Sit-gliders provide a seat, and sometimes a cockpit, for the pilot, and they are ordinarily equipped with stick and rudder-bar. Hang-gliders, now comparatively rare, are controlled mainly by the swinging of the pilot's body, which is suspended from the fuselage by his arms, or otherwise.

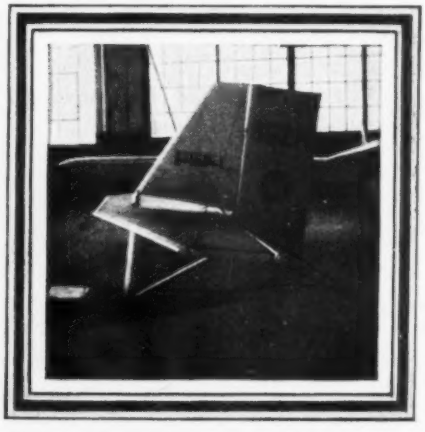
Gliders may also be classified as water and land gliders. Water gliders are built to take off from and land on the water.

Gliding and Soaring. Before you begin a study of motorless flight, you must understand the meaning of the terms, "gliding" and "soaring". Gliding is the inclusive term which refers to flight in an engineless, heavier-than-air craft. Gliding may also mean, specifically, taking off from a height in a glider and coasting downward through the air. As opposed to gliding in this sense, is the word soaring, or sail flying.

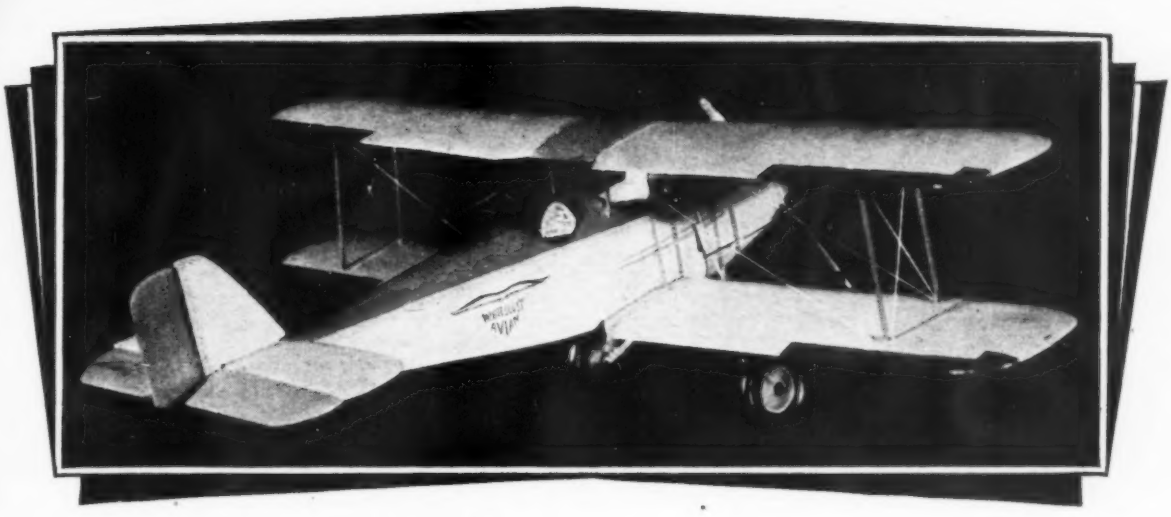
Soaring means, not gliding downward, but rising to a greater altitude by utilizing the kinetic energy of air. The soarer must be at the will of the pilot. He will fly it to a certain goal, and return, if he desires, to the starting point. Upward currents are usually found on the windward side of mountains, which deflect upward the wind which has been blowing across the level ground. Upward currents are also found under cumulus clouds. Soarers may be lifted to great heights by upward currents.

The First Flight. The first flight will give you an idea of how most of the important gliding maneuvers are performed, all within a few seconds. You will probably never have learned so much in so short a time. In order to derive the most benefit from this first flight, you must have some conception beforehand of what it will be like. In general, the procedure on this momentous occasion is as follows:

The instructor makes a few preliminary remarks about what you are to do. He then conducts you to the ship, which is on the crest of a gentle slope. Or, perhaps you help to haul it up there. He tells you to get into the seat and to fasten the safety belt. He directs you to try moving the stick and rudder-bar, and to observe the resulting movements of the control surfaces. He gives you some instructions concerning the way in which you must handle the glider in the air, but he tries to make these so few and so simple that they will not be confusing. Then, before you have time to become agitated at the thought of your first leap into space, he directs the ground crew to launch your glider. If, during your short flight, (*Continued on page* 62)



Notice the elevators, made in two halves, which are hinged to the stabilizers in this photograph of the tail group. Also clearly shown is the rudder, which is hinged to the fin



How to Build
A Whittelsey Avro Avian

A Two Foot Scale Model of This Outstanding Light Sport Plane

See Plans on Pages 10 to 15

THE Avro Avian is one of the leading light sport planes in England and the United States today. It was designed by Mr. A. V. Roe, a noted English motorcycle and airplane builder. The Avian holds several altitude and long distance records, and is a popular little flyer.

FUSELAGE

The fuselage is cut or sawed of 2″ x 3″ x 15″ balsa. Trace the side view of the fuselage on the balsa block and then cut. Do this slowly and carefully. The front of the body from which the Cirrus motor cowling is to be shaped requires careful work. The cockpits are either drilled or cut out. Use a knife if a seat in the cockpit is to be made. Sandpaper the rough places.

WINGS

Use 1/2″ x 3″ x 12″ balsa for the four half wings. To obtain the wing profile use a knife or rough sandpaper wrapped round a block. Be sure the rounded edges on the wings are alike. Take the balsa block for your center section, which measures 1″ x 2″ x 2-1/2″. This is also cut to shape like the wing. Follow the drawings carefully and refer to them frequently. When the wings are completed, put the dowels in place, ambroid where necessary and set aside to dry.

TAIL SURFACES

The tail surfaces, which consist of the rudder and elevators, are cut from 1/4″ thick balsa. Use a coping saw. Sandpaper can be used to streamline them, as shown in the drawings of the rudder and elevators.

LANDING GEAR

Balsa, bamboo and wire are used to make the landing gear. Assemble the shock absorbers as shown in drawing. Two will be needed; one for each side, and also a pair of 1-7/8″ diameter wheels. The latter can be of wood, celluloid, or rubber. The Forest rubber wheels are preferable as they resemble the wheels of an airplane more closely than the wood; and act as additional shock absorbers. Assemble and fix the landing gear to the fuselage. Allow at least two hours to dry.

WING ASSEMBLY

In attaching the wings, adjust the lower one first. By this time the dowels are cemented in tightly. Push the wings in the sides of the fuselage. If this is a little difficult, use a drill or a long nail of 1/8″ diameter for making holes. Give the proper angle of incidence and dihedral, as shown in drawing. Allow a few hours to dry. The center section is now attached. Bamboo is used for struts because of strength. This can be fairly streamlined with rough and smooth sandpaper. Allow an hour and a half to dry.

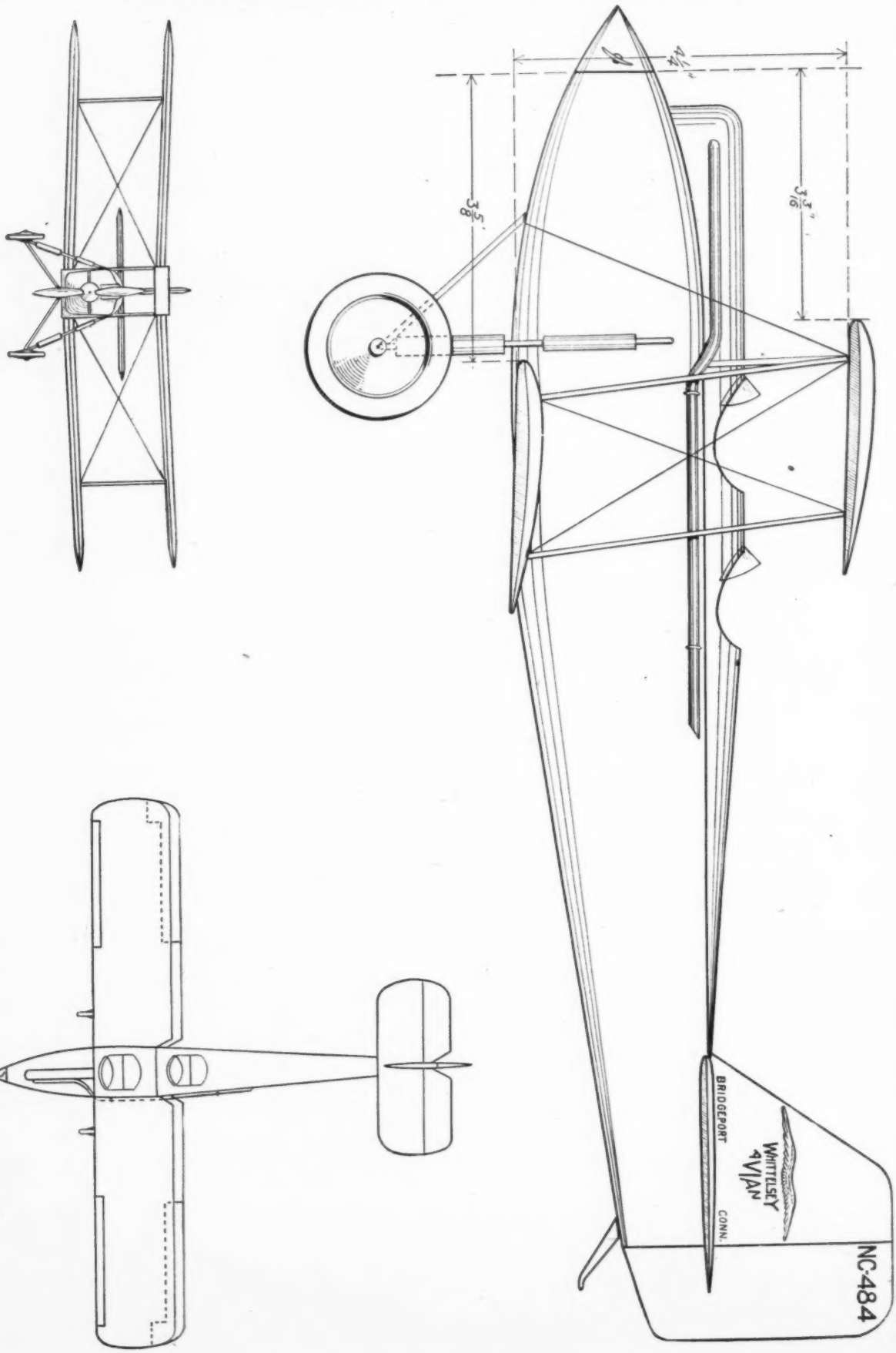
When thoroughly dry, take either half of the top wing and join it to the center section. Do this carefully and be sure to have the correct amount of gap, as specified in drawing. Now do the other half. Use sticks of wood to hold the wings in the proper angles of incidence and dihedral. Notice that both upper and lower wings have the same amount of incidence and dihedral. In doing this, the tail should be up in flying position. Allow two hours for hardening.

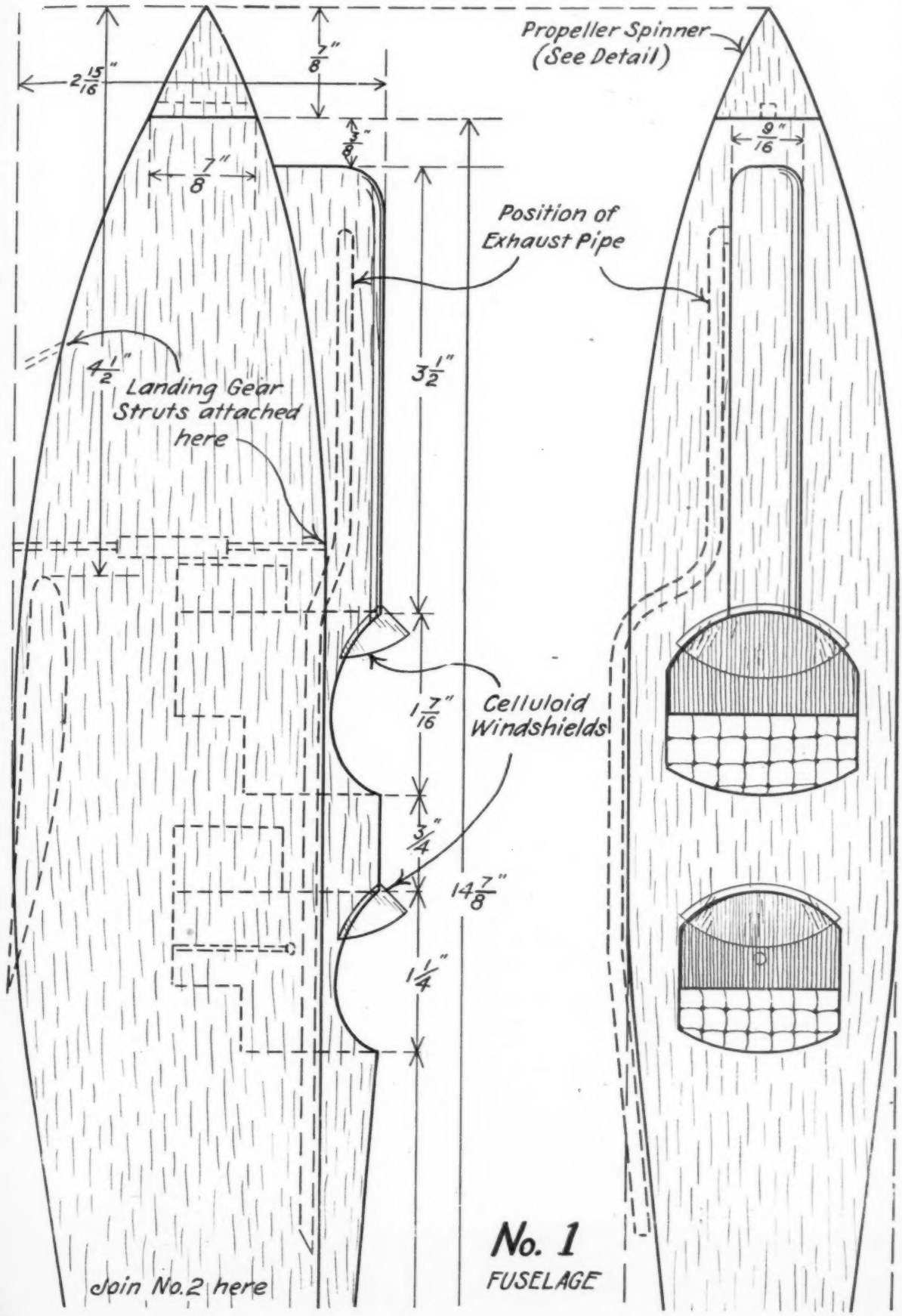
TAIL ASSEMBLY

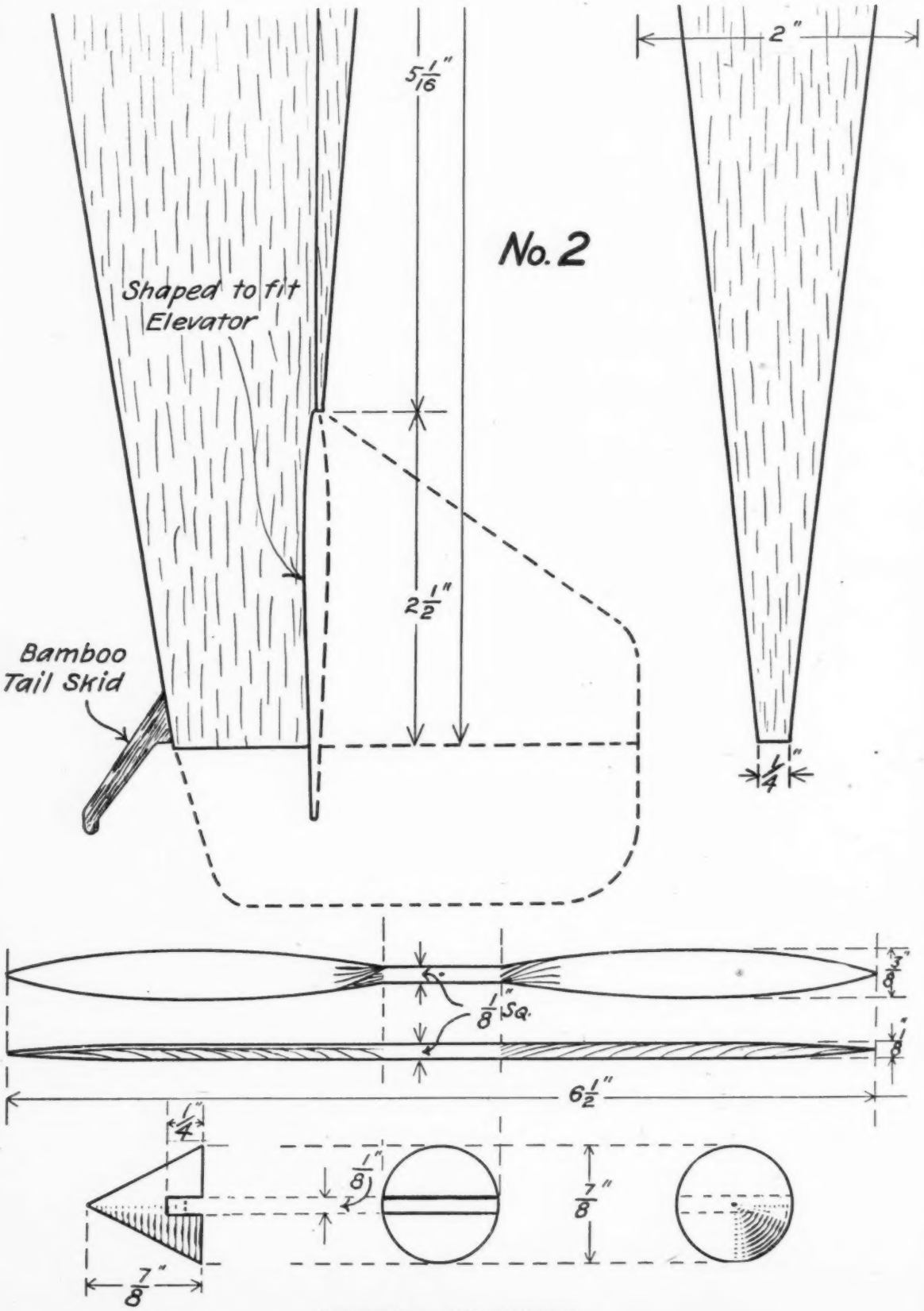
The tail group is cemented in position as shown in drawing. Be sure they are straight. The tail skid is made of a piece of bamboo and ambroided in position.

PROPELLER

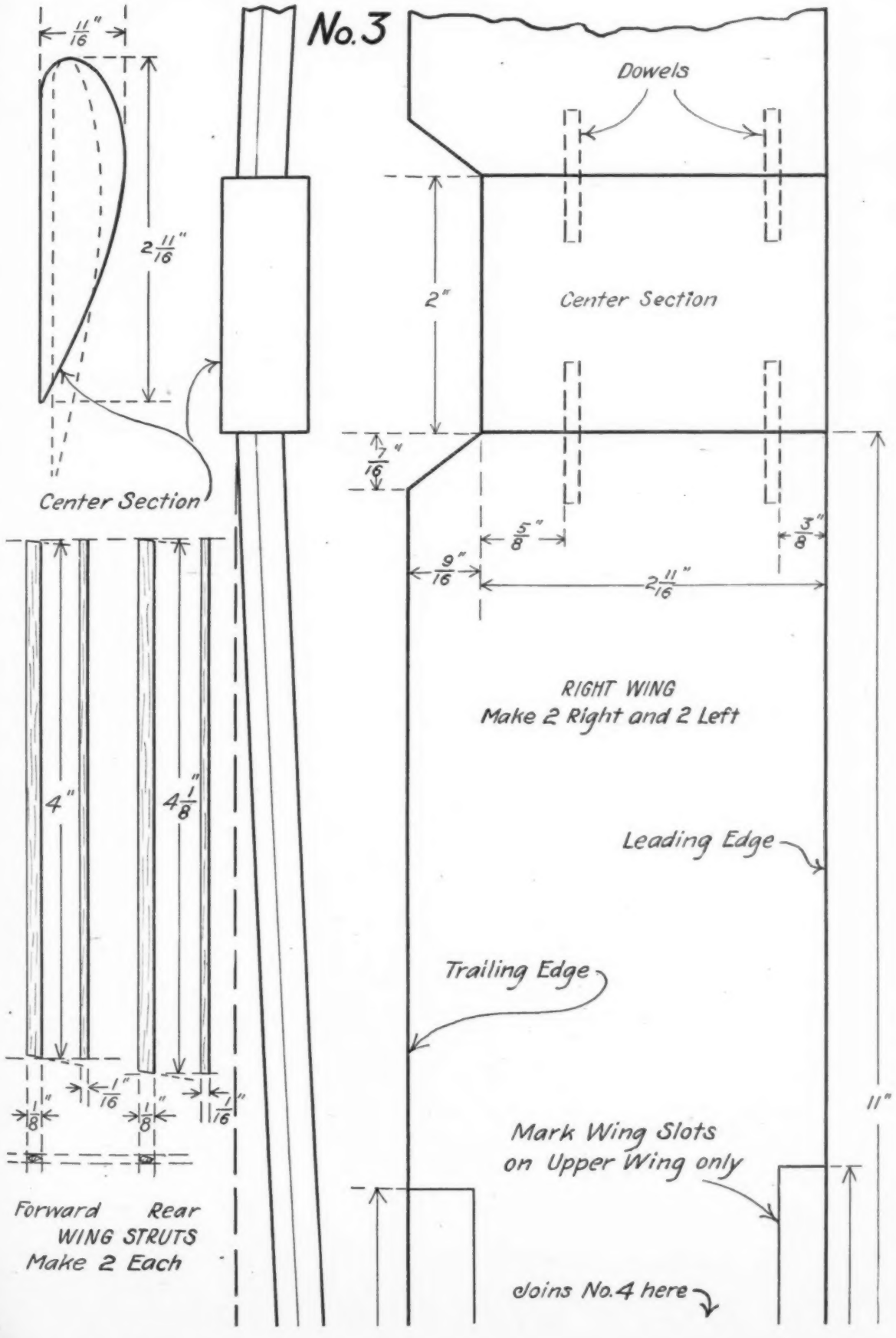
The propeller is carved from 3/8″ x 1/2″ x 6″ balsa cut to shape as shown in drawing. A needle-sized hole is drilled through the center of the propeller. Sandpaper and give it a smooth finish. The bullet nose or the spinner is made from 7/8″ x 7/8″ x 1″ balsa. Cut out the notch in back. After (*Continued on page* 60)

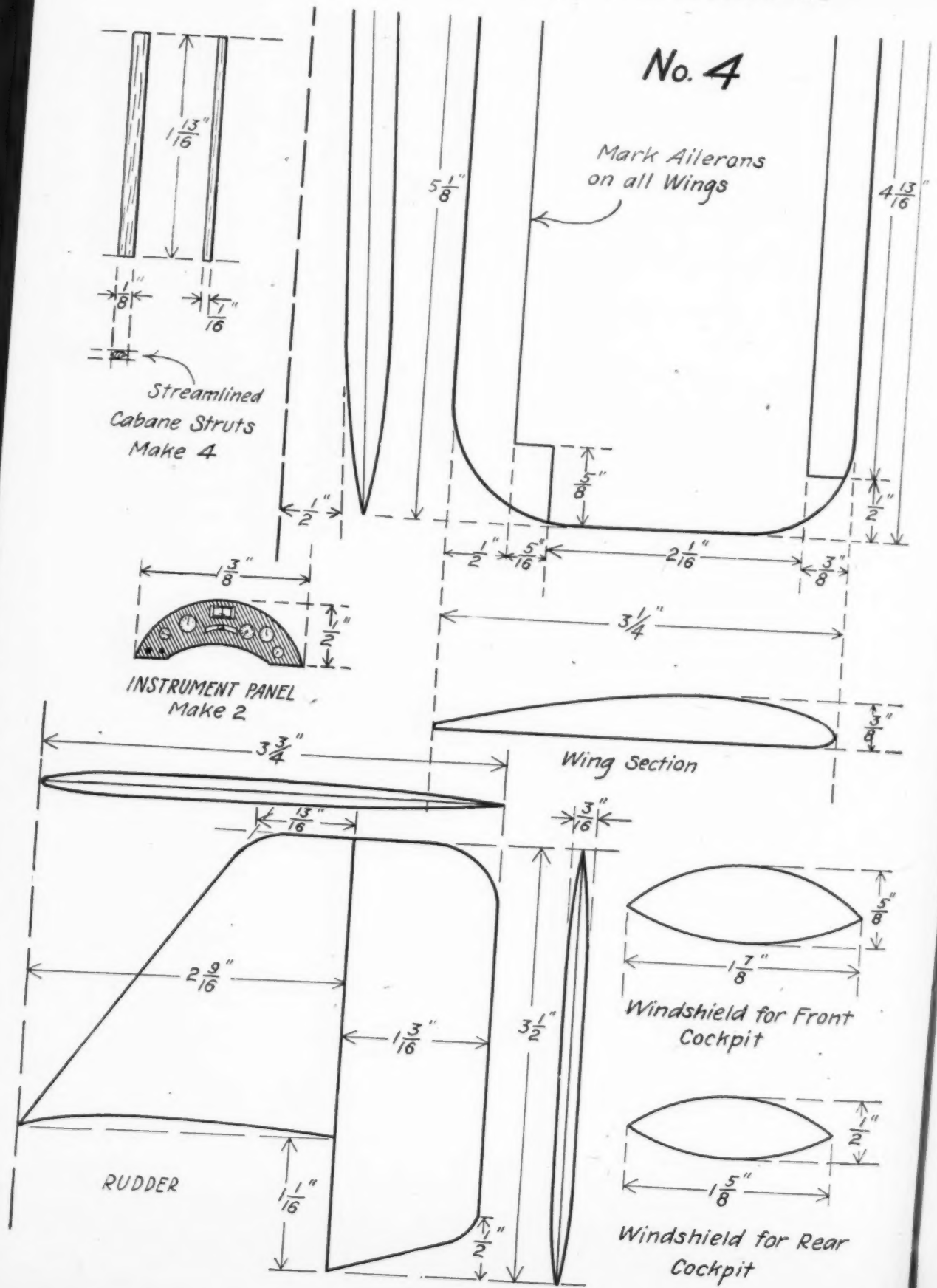

BRIDGEPORT
WHITTELSEY AVIAN
CONN.
NC-484

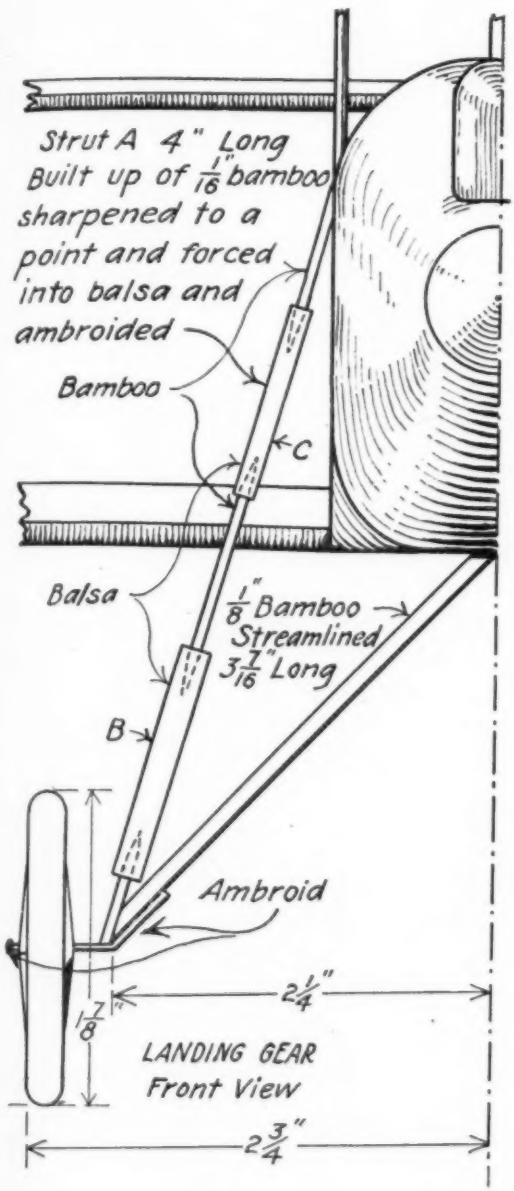

Propeller Spinner
(See Detail)
2 15/16"
7/8"
7/8"
7/8"
9/16"
Position of
Exhaust Pipe
4 1/2"
Landing Gear
Struts attached
here
3 1/2"
1 7/16"
Celluloid
Windshields
3/4"
14 7/8"
1 1/4"
Join No.2 here
No. 1
FUSELAGE

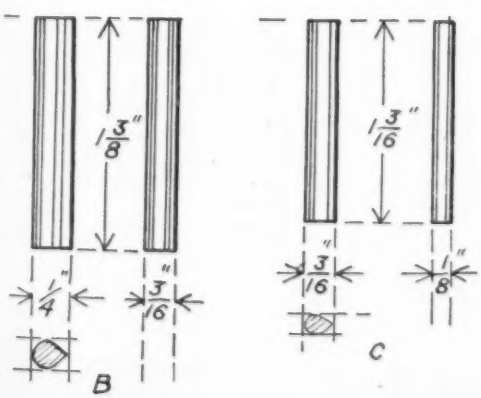


PROPELLER AND SPINNER

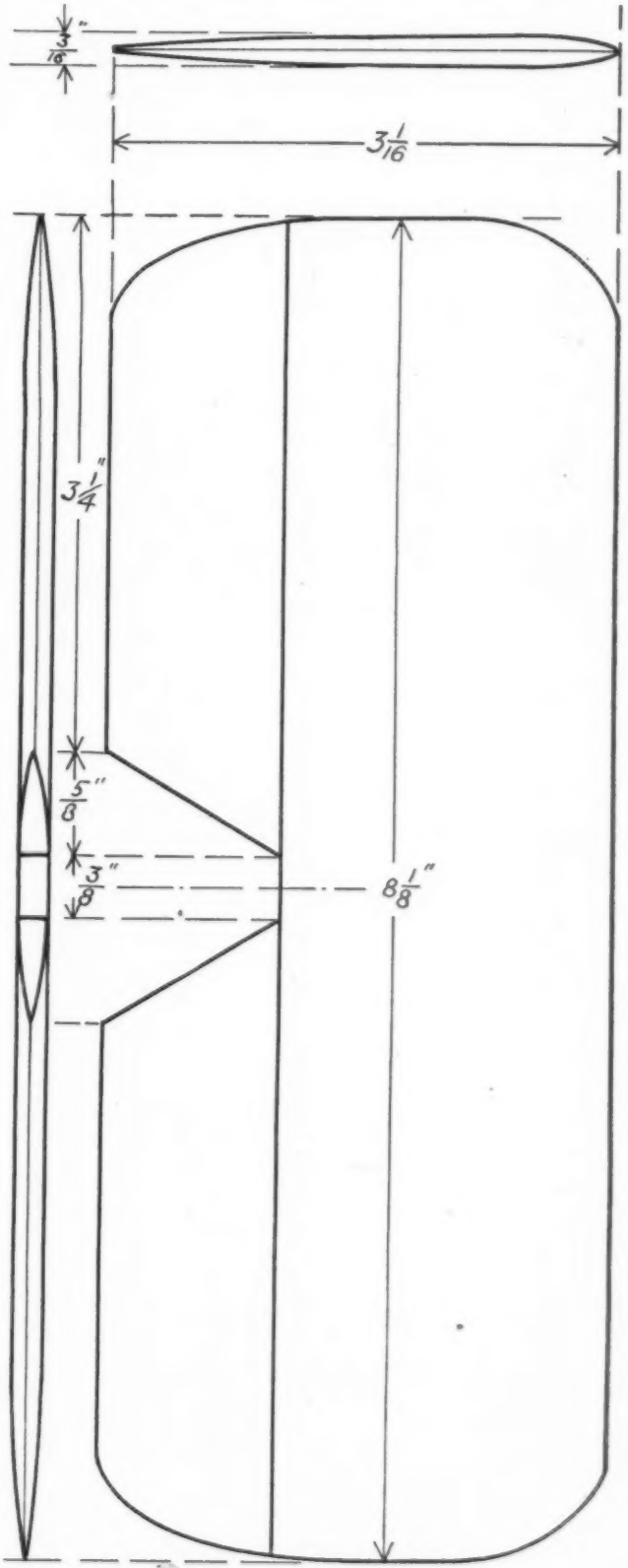

No.3
11/16"
2 11/16"
Center Section
Dowels
2"
Center Section
7/16"
5/8"
3/8"
9/16"
2 11/16"
RIGHT WING
Make 2 Right and 2 Left
Leading Edge
Trailing Edge
11"
Mark Wing Slots
on Upper Wing only
Joins No.4 here
4"
4 1/8"
1/8"
1/16"
1/8"
1/16"
Forward Rear
WING STRUTS
Make 2 Each


No. 4
Mark Ailerons on all Wings
1 13/16"
1/8"
1/16"
Streamlined Cabane Struts Make 4
5 1/8"
4 13/16"
1/2"
5/8"
1/2"
5/16"
2 1/16"
3/8"
1 3/8"
1/2"
INSTRUMENT PANEL Make 2
3 1/4"
3/8"
Wing Section
3 3/4"
13/16"
3/16"
2 9/16"
1 3/16"
3 1/2"
RUDDER
1 1/16"
1/2"
5/8"
1 7/8"
Windshield for Front Cockpit
1/2"
1 5/8"
Windshield for Rear Cockpit





Balsa Sections of Strut A

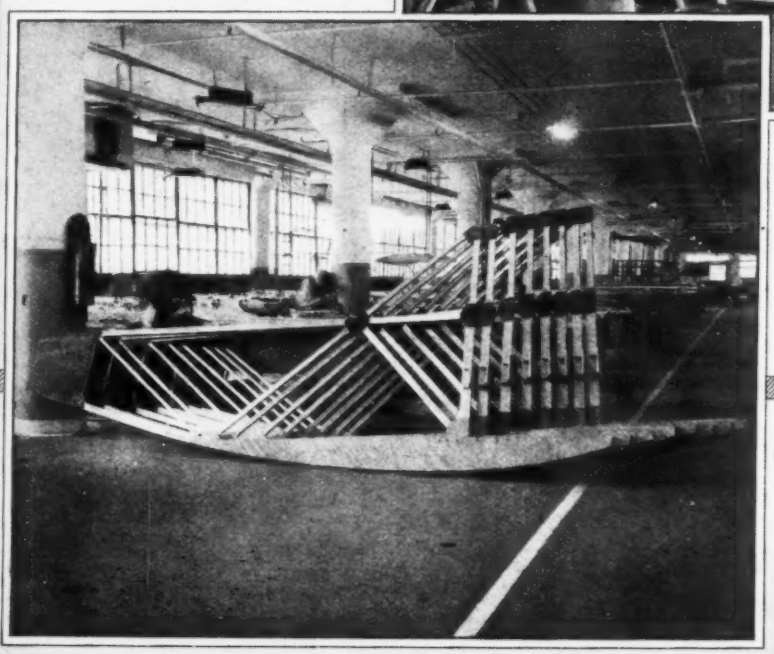


ELEVATOR

No. 5

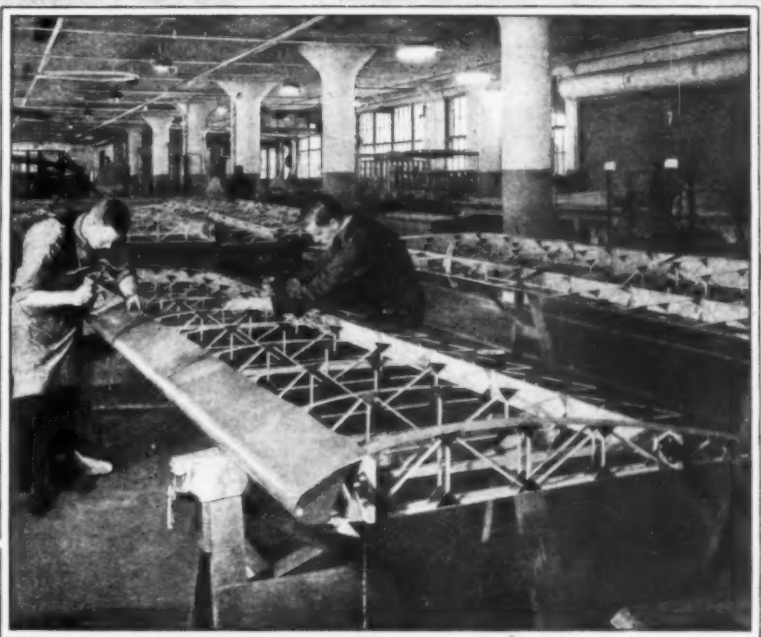
THE great interest manifested everywhere in gliders is responsible for the tremendous activities in glider manufacturing at the present time. To the left is a scene in the Detroit Aircraft Factory, showing the department in which the small wing parts of a Gull glider are being made

THE photograph at right gives a graphic view of glider wing construction, in which every possible care is taken as in the manufacture of airplane wings. These parts are shown here in the primary stage of construction and will later be sent on to other workmen for further building



THE long, clean lines of the fuselage of a primary glider are clearly seen at the left. The ribs have been joined together, all other constructional details attended to, and the glider is now awaiting assembly by another crew of workers

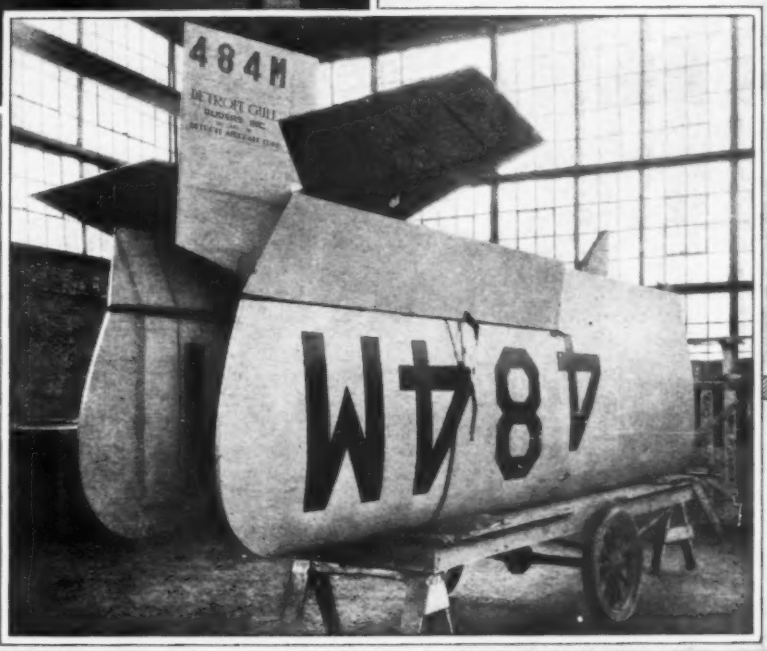
AT right is shown a scene in an advanced stage of wing construction. Note the multi-ribbed airfoil on which the men are working and the care taken in covering the leading edge before the actual covering of the wing takes place

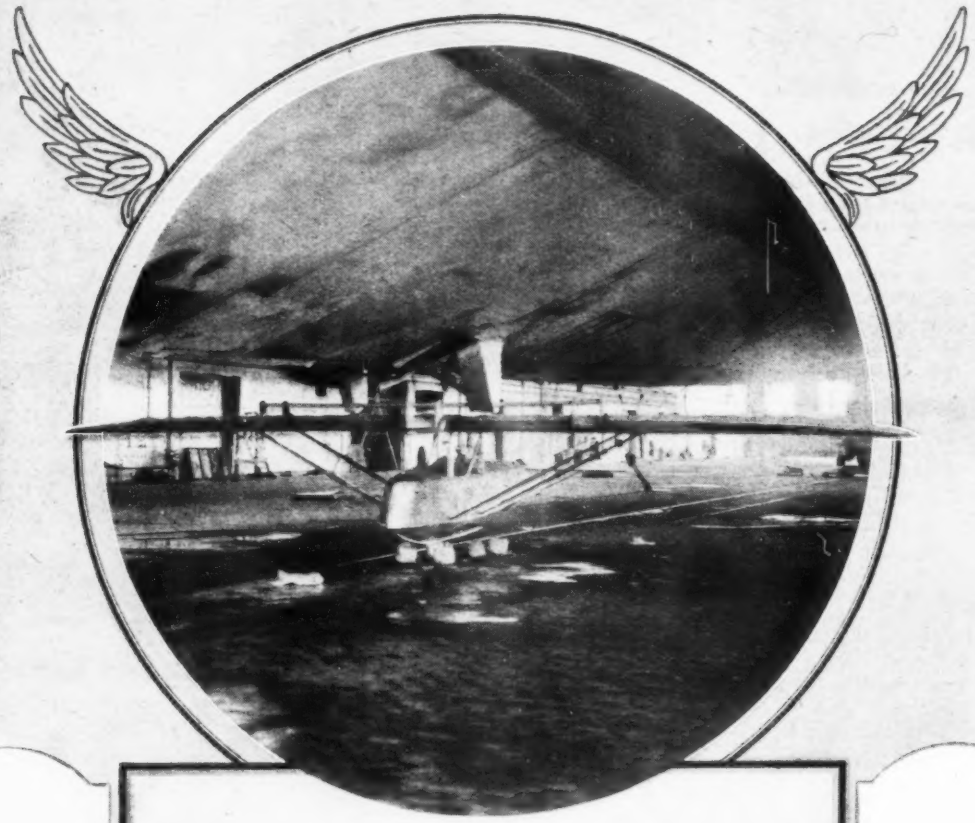


A WING at a stage nearing completion is shown at the left. This vital component of an aircraft, on which so much depends, is now being covered with fabric. Note that this half of a wing is nearly covered

AT right is a Gull glider, on which so much time and care has been expended, complete and ready for crating

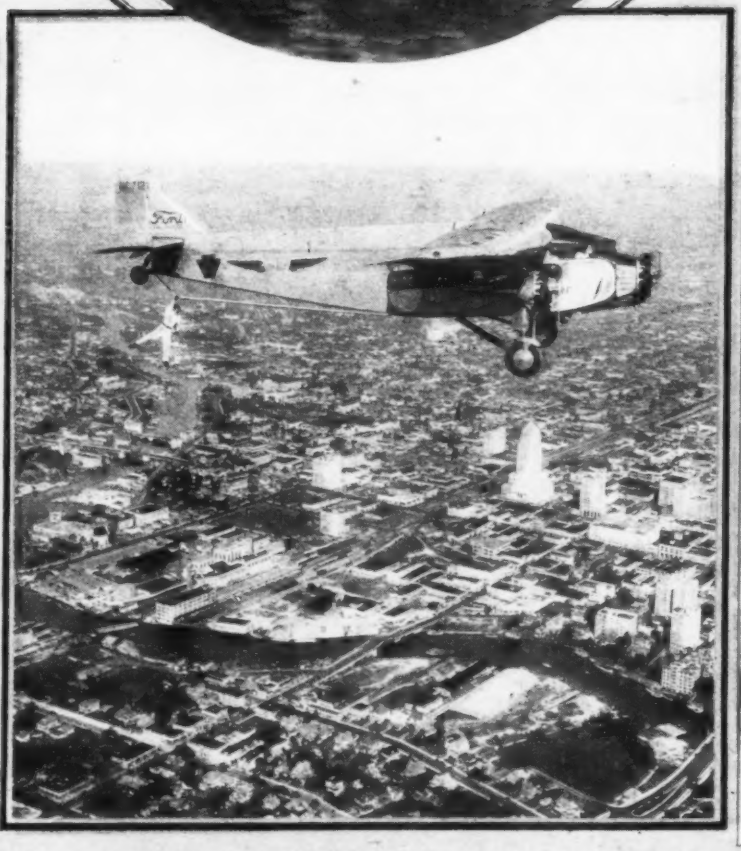
Photos Courtesy Detroit Aircraft Factory





IN circle is shown the 204 lb. glider in which Lieutenant Ralph S. Barnaby was taken aloft attached to the navy dirigible, Los Angeles, which was traveling at thirty-nine knots an hour. At 3,000 ft. the glider was released over Lakehurst, N. J., and remained aloft for 13 minutes. Lieutenant Barnaby then landed successfully

International



A DEMONSTRATION was made recently at Miami, Fla., (left) by James Terry with a contrivance of his own invention. This was to make possible the repair of a rudder control cable in four minutes while in flight and proved successful. Such a device would remove much of the hazard of passenger flying

International

Special Course in Air Navigation

The Mainstay of Successful Piloting

By
Capt. LESLIE S. POTTER

IN the following series of articles, the author has endeavored to set out as clearly as possible, and in as simple words as possible, the art of navigation in the air.

Your interest in these will depend on your interest in flying, and whether you will consider yourself a pilot when you have learned to take a plane off the ground and bring it down again without breaking anything.

To those who do, these articles will be valueless, but to those who aspire to be more than fair weather pilots, to be able to fly from place to place without sole recourse to roads and railways, to be able to fly above the clouds with safety if they are too low to admit of safe flying beneath them, an intelligent interest in these articles will be of incalculable value.

Air navigation is not a complicated subject, an intense knowledge of mathematics and trigonometry is not necessary, merely the average person's powers of common-sense reasoning. The whys and wherefores of all the facts will only be given where they are necessary to understand the facts, as it is considered that in a short course too many of these would be confusing and apt to mislead the reader.

If some of the points seem too elementary do not pass them by, there is a reason for their inclusion, if some points do not seem clear, be patient, you will generally find some information further on, that will clear them up as you proceed. Answer the questions at the end of each article and wait for their solutions in the next issue, and should you find any points requiring further explanation, send a letter with a stamped addressed envelope to the editor setting out your problems and a reply will be sent you explaining the points raised.

Keep all your copies of "MODEL AIRPLANE NEWS" for future reference, you will probably need them to refer to as you go on.

THE EDITOR

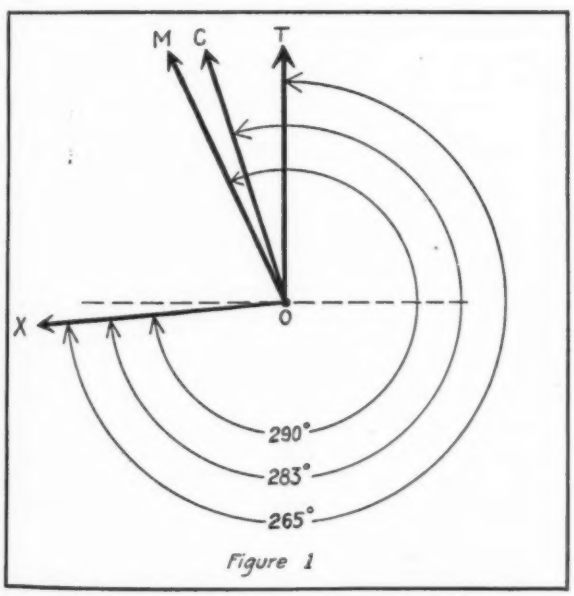


Figure 1

True bearing	Angle TOX — 265°
Magestic bearing	Angle MOX — 290°
Compass bearing	Angle COX — 283°
Variation	Angle TOM — 25°W
Deviation	Angle MOC — 7°E
Compass error	Angle TOC — 18°W

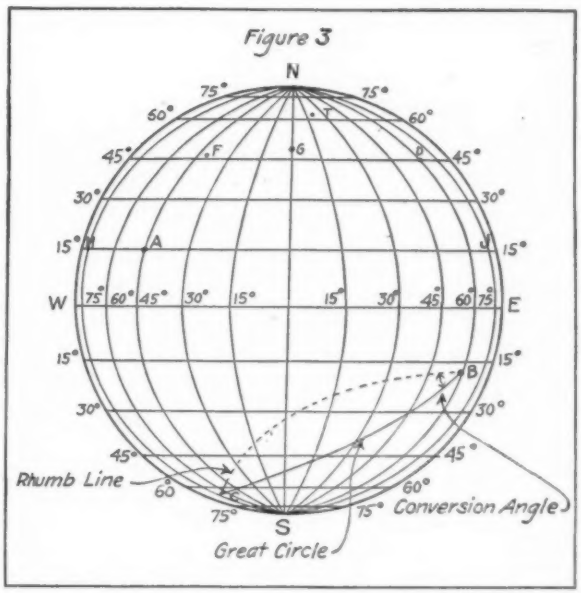


Figure 3

IN this first article we will start with explanations of certain definitions which it is essential you should know, as these will crop up from time to time in succeeding articles.

The earth is a sphere so that all lines on its surface must necessarily be curves, the lines of longitude running north and south and meeting at the poles, and the lines of latitude running east and west round the earth parellel to the equator, are all curves.

THE AGONIC LINE is a line joining points on the earth's surface where there is no magnetic variation—where true north and magnetic north are coincident.

BEARING or AZIMUTH. Before you can commence setting a course for any destination, you must know the bearing. The bearing is the angle between a line drawn from your starting place to your destination, and the meridian passing through your starting place. The angles are measured clockwise from 0° to 360°. There are two kinds of bearings, true and magnetic, according to whether the angles are measured from the true or the magnetic meridian. See Figure I.

COURSE. True Course is the angle between the fore and aft line of the plane and the true meridian.

Magnetic Course is the angle between the fore and aft axis of the plane, and the magnetic meridian.

Compass Course is the angle between the fore and aft axis of the plane and the compass needle. See Figure II.

In order to discover which way you must steer an airplane by the compass in it to reach a given destination, the true course is first obtained, then the magnetic course, and finally the compass course. This will be explained later.

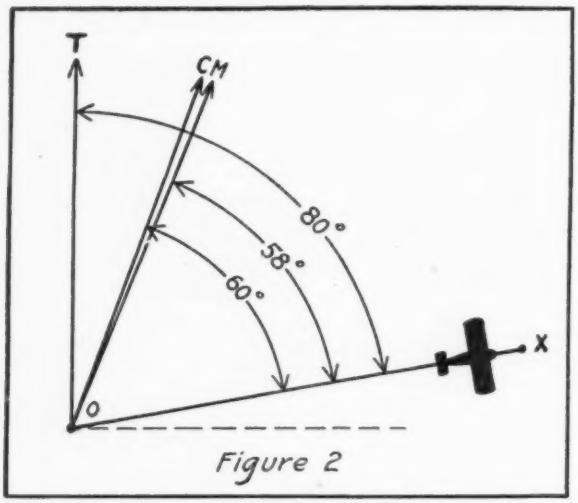


Figure 2

True course	Angle TOX — 80°
Magnetic course	Angle MOX — 58°
Compass course	Angle COX — 60°
Variation	Angle TOM — 22°E
Deviation	Angle MOC — 2°W
Compass error	Angle TOC — 20°E

DEVIATION. A magnetic compass needle, if freely suspended, and uninfluenced by anything else, will point to the magnetic pole; but local magnetism in the plane itself will often cause it to deviate, and it is the angle between the direction of a particular compass needle and the magnetic meridian, that is called deviation. It is named East (+) or West (—) according to whether it points East or West of the magnetic meridian. (See Figures I and II.)

DRIFT. Drift is caused by the action of the wind on an airplane in flight, which blows it off the course it is steering. It is the angle between the direction a ship is steering and the course it is actually making good over the ground. It is measured to port (left) or starboard (right) according to which direction the plane is drifting.

EQUATOR. The equator is a great circle round the middle of the earth, and equidistant from its poles. (W-E in Figure III.)

FIX. A fix is a point on a map generally determined by the intersection of two or more position lines.

GREAT CIRCLE. A great circle is any circle having a plane which passes through the center of the sphere. The equator is the best example of a great circle. If you preserve the mental picture of a sphere, you will see that there can be a large number of circles on a sphere which fulfill these conditions. All the meridians are great circles. The earth, being round, the shortest distance between any two points on it is obviously the line of a great circle. (See Figure III.)

SMALL CIRCLE. A small circle is a circle, the plane of which, does not pass through the center of the earth. All parallels of latitude, except the equator, are small circles. (See Figure III.)

LATITUDE. A parallel of latitude is a small circle parallel to the equator. (H-A-J in Figure III.)

The latitude of a place is the arc of a meridian intercepted between the equator and the place, and is named N. or S. according whether it is N. or S. of the equator. (On Figure III the latitude of A is 15° N and C 68° S.) *Difference of Latitude.* The number of degrees of latitude a destination is N. or S. of the point of departure, is said to be the difference of latitude between these places. Written d.Lat. (On Figure III the d.Lat. from A to E is 75° S.)

LONGITUDE. Longitude is a smaller arc of the equator intercepted between the prime meridian and the meridian of the observer's position. It is measured E. or W. of the Prime Meridian in degrees, minutes and seconds, up to 180°. (In Figure III Long. of A is 45° W., of D 60° E.) *Difference of Longitude.* The number of degrees of longitude a destination is E. or W. of a point of departure, is the difference of longitude between these places. Written d.Long. (See Figure III. The d.Long. from E to A is 120° W.)

ISOGONALS. Isogonals are lines drawn on maps or charts joining places at which variation has the same value.

PRIME MERIDIAN. The Prime Meridian is the meridian from which longitude is measured E. or W. The meridian of Greenwich, England is the one accepted by most countries as the prime meridian.

MERIDIAN. A meridian is a great circle passing through the earth's poles. (N-A-S and N-E-S in Figure III.)

NAUTICAL MILE. A nautical mile or knot, is the length of one minute of latitude, 6080 feet. *Symbol.* One degree of latitude equals 60 nautical miles.

POLES. The poles are the extremities of the imaginary axis of the earth, and around which it revolves.

POSITION LINE. A position line is a line obtained from a bearing from an airplane on some object on the ground, or on some celestial body, when it is known that somewhere on this line the plane must be. A bearing is taken on some object on the ground which can be identified on the map. For example, a certain lake is observed from the air, and it is found that the bearing on this lake from the plane is 45°. A line is drawn on the map from the lake at an angle of 225° (to obtain the reciprocal bearing of the plane from the lake). It is then known that the plane must be somewhere on that line. Such lines are called position lines.

RHUMB LINE. A Rhumb Line is any curve on the earth's surface, which cuts all meridians it meets, at the same angle. The equator and parallels of latitude are rhumb lines. A straight line drawn on a Mercator's chart is a rhumb line. (See Figure III.)

TRACK. Track is a line representing the actual path of an airplane relative to the ground.

VARIATION. Also called Declination, is the angle between the direction a freely suspended magnetic compass needle would indicate, if it were uninfluenced by other forces, and the true meridian. It is named E.(+) or W. (—) according to whether it points E. or W. of the true meridian. (See Figures I and II.)

A. ..... 30°N.

B. ..... 20°N.

C. ..... 10°N.

D. ..... EQUATOR

SCALE ON A MERCATOR'S CHART

FIGURE 4.

POSITIONS, DIRECTION AND DISTANCES

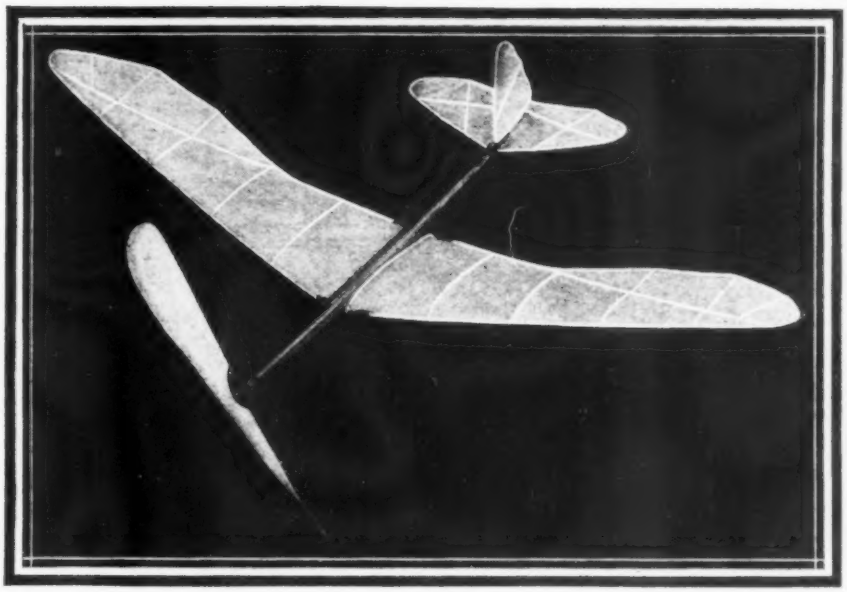
Positions of places on the earth's surface, may be defined by their latitude and longitude. The bearing of one place to another may be given by the d.Lat. and the d.Long. between the two places.

For example, if the latitude and longitude of Point A were Lat. 40°30′N and Long. 35° 10′W. and of Point B were Lat. 50°07′N and Long. 12°20′E, then the d. Lat, and the d. Long, of A from B would be arrived at as follows:

Point B. Lat.	50°07′N.	Long.	12°20′E.
Point A. Lat.	40°30′N.	Long.	35°10′W.
d.Lat.	9°37′S.	d.Long.	47°30′W.

DISTANCE. Knowing that one degree of latitude = 60 nautical miles, the distances between points for which latitudinal positions have been given, may be easily calculated. Note that the results so obtained will be Great Circle distances. (*Continued on page* 52)

How to Build A Gull Endurance Tractor



A Good-Looking Flyer of Bird-Like Design

THE Gull has been designed by Armour F. Selley, who in 1912 won the Leo Stephens Trophy and the Bamberger Cup as well as the title of world's champion model flyer and builder. At that time he was the originator of the large slow-revolving propeller. It is interesting to note that prior to this, the propellers in use were only about five to seven inches in diameter and it is well to emphasize that too great stress cannot be laid on the propeller of any model built, for that is one of the vital factors contributing to successful flight.

Study the photograph and note its new and attractive lines. The small auxiliary part takes the place of the ailerons of a real airplane and increase the stability of the wing 75 per cent. The sweepback of the wing, with the entering and trailing edges coming to a point, are very attractive and the tips of the wing, formed with reed or bamboo, give it remarkable additional strength. A dihedral of 30 degrees gives the model unusual stability. Notice the unusually small rudder and stabilizer for the size of the propeller, which is 12". Even with this, there is no torque. The fuselage stick is beautifully tapered, contributing to the birdlike appearance of the plane and its resemblance to a gull.

First, taper both back and front of the fuselage stick, which is 3/16" x 5/16" balsa 17" long, as per drawing. Remember the better this is finished with sandpaper, as with all wood parts, the greater will be the success of the finished product. Wrap the bearing, which is made of half a cotter pin, and drill to the front end of the fuselage. Then drill the rear end of the fuselage stick and insert the 3/32" x 3/8" eyelet and cement in place. Now form the rear hook and push it through the stick and cement.

Cut out of 1/16" balsa two each of the ribs A, B, C, D, E and the auxiliary ribs 1/16" square. The entering and trailing edges are 15 1/8" and 14 1/8" long respectively. Rib A is 5 1/4" long, B is 4 1/8" long, C is 3", D 2 1/4" and E 1 1/4" long. Now nail in a flat board small nails and rest the entering edge, 15 1/8" long, against it.

THEN take the trailing edge and place it 5 1/4" from one end and tapering to the tip. Cut off the edge to evenly butt the entering edge and glue in place. Put the ribs in position, glue in place, and allow to dry. Be sure to make a pair, one left and one right. Now glue the auxiliary ribs in place and having made the 1/16" balsa wedge, glue in position.

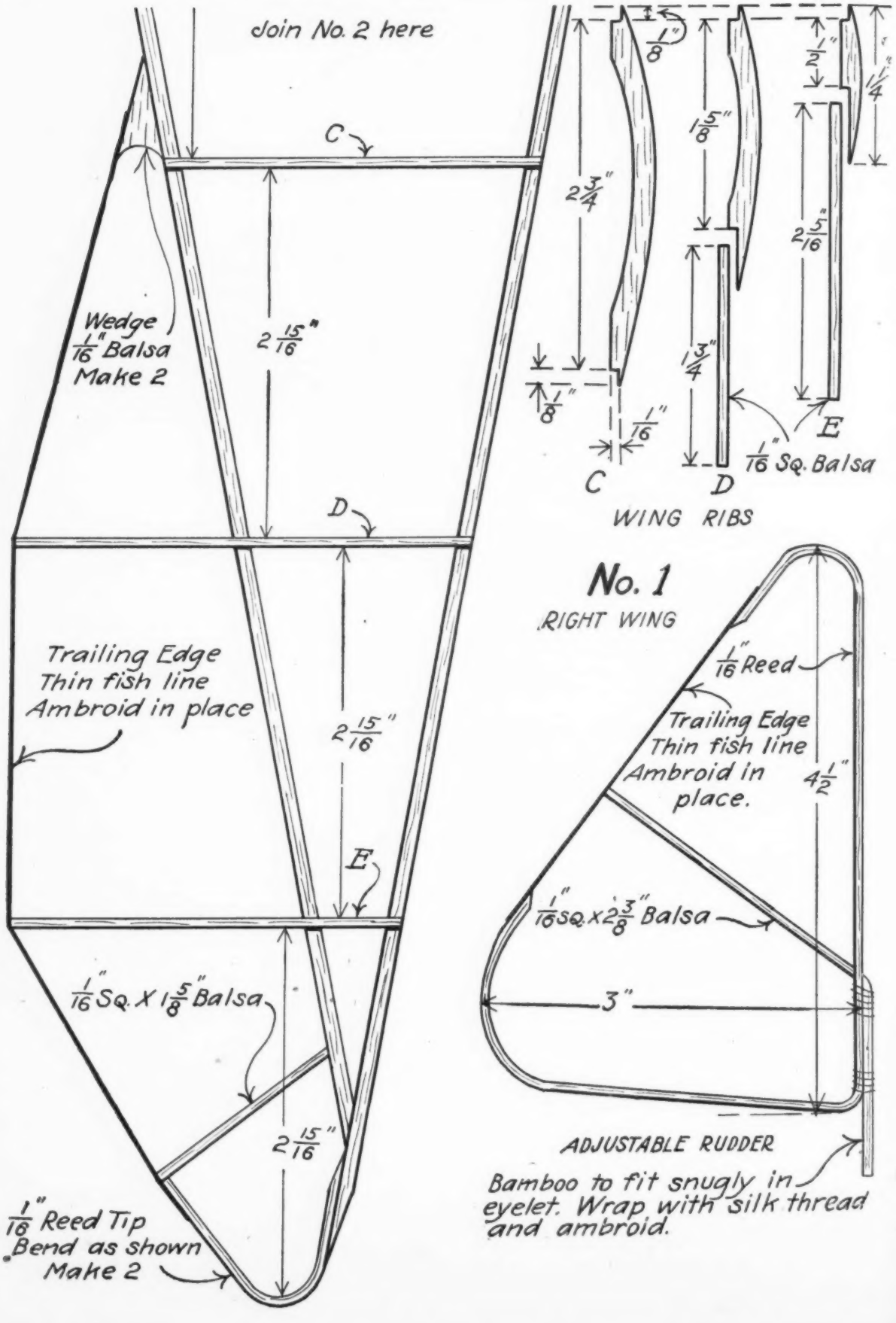
Next take two pieces of 1/16" reed about 3" long and

(*Continued on page 53*)

Necessary Materials

1 piece	1-5/16" x 1-1/8" x 12"	soft balsa	propeller
1 piece	3/16" x 5/16" x 17"	hard balsa	fuselage stick
4 pieces	1/8" x 3/32" x 15"	hard balsa	entering and trailing edges
2 pieces	1/16" x 5/8" x 17"	hard balsa	main wing ribs
2 pieces	1/16" x 1/16" x 16"	hard balsa	stabilizer, rudder, wing ribs
1 piece	1/16" x 5/8" x 10"	hard balsa	main spar in stabilizer wing wedges, reinforcement pieces and tail rib
1	1/16" x 3/8"	eyelet	rudder socket
1	1/32"	eyelet	shaft bearing
1	1/32"	washer	shaft bearing
1	1/2"	cotter pin	propeller bearing
1 foot	.025	music wire	shaft and clips
2 feet	1/16"	reed	wing tips and rudder
3 feet		fish line or twisted hard cord	edges of wing stabilizer and rudder
1 dram		ambroid	
1 sheet	20" x 12"	Japanese tissue	covering
5 feet	1/8"	flat rubber	motor
1 piece	1/16" x 1/16" x 3"	bamboo	rudder staff

See Plans on Pages 22 to 26


Join No. 2 here
C
D
E
Wedge
1/16" Balsa
Make 2
2 15/16"
Trailing Edge
Thin fish line
Ambroid in place
1/16" Sq. X 1 5/8" Balsa
1/16" Reed Tip
Bend as shown
Make 2
1/8"
2 3/4"
1 5/8"
1/2"
1 1/4"
2 5/16"
1 3/4"
1/16"
1/16" Sq. Balsa
WING RIBS
No. 1
RIGHT WING
1/16" Reed
Trailing Edge
Thin fish line
Ambroid in
place.
4 1/2"
1/16" Sq. x 2 3/8" Balsa
3"
ADJUSTABLE RUDDER
Bamboo to fit snugly in
eyelet. Wrap with silk thread
and ambroid.

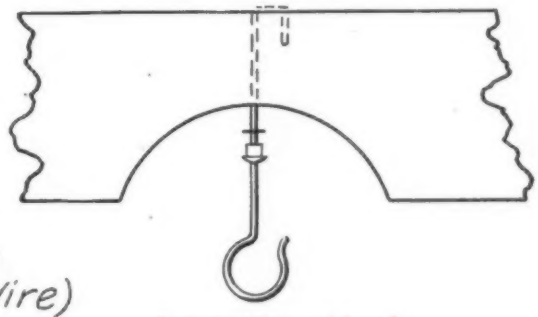
No. 2

Front Wing Clip

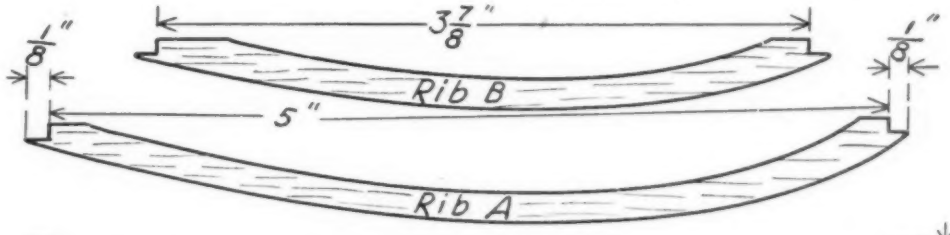
Rear Rubber Hook

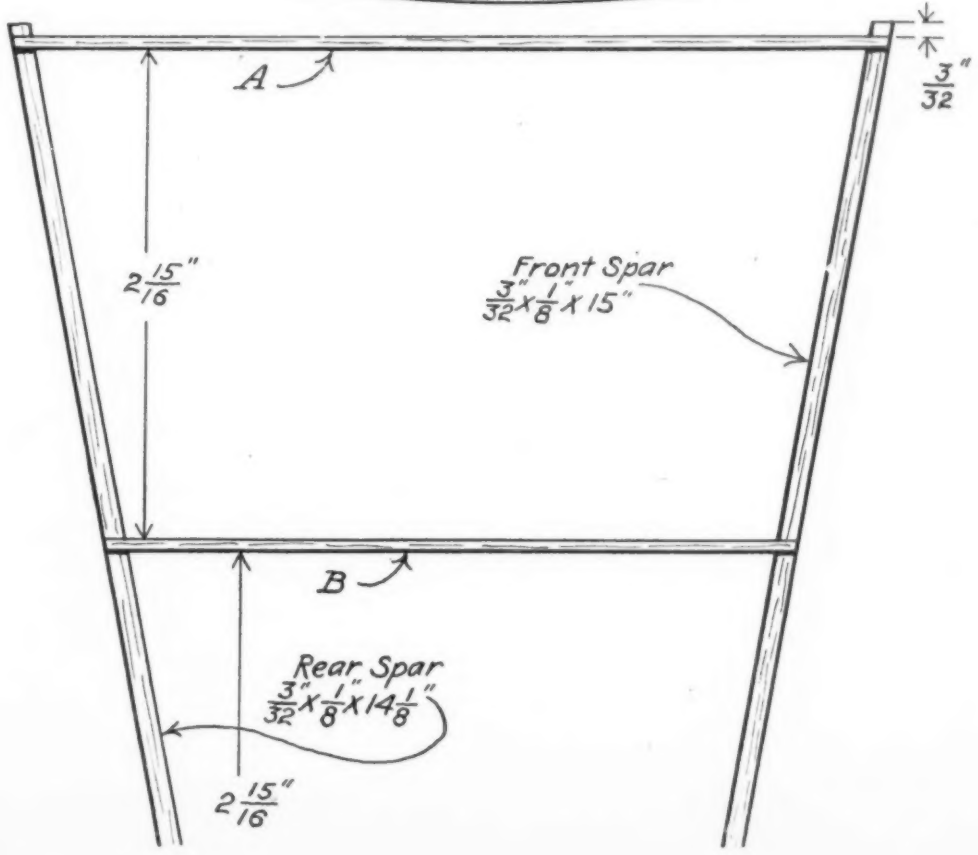
Rear Wing Clip

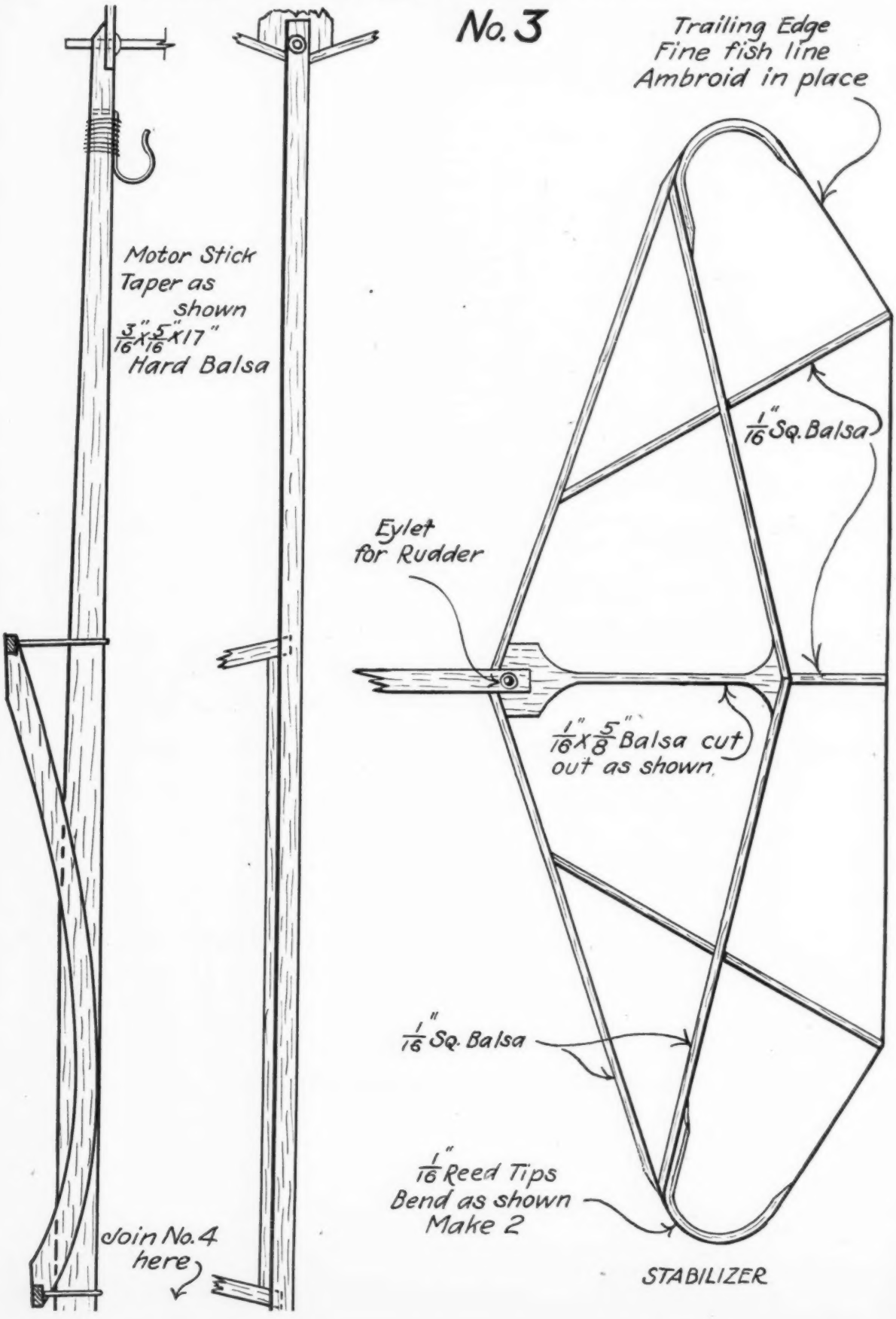
FITTINGS
(.025 Music Wire)

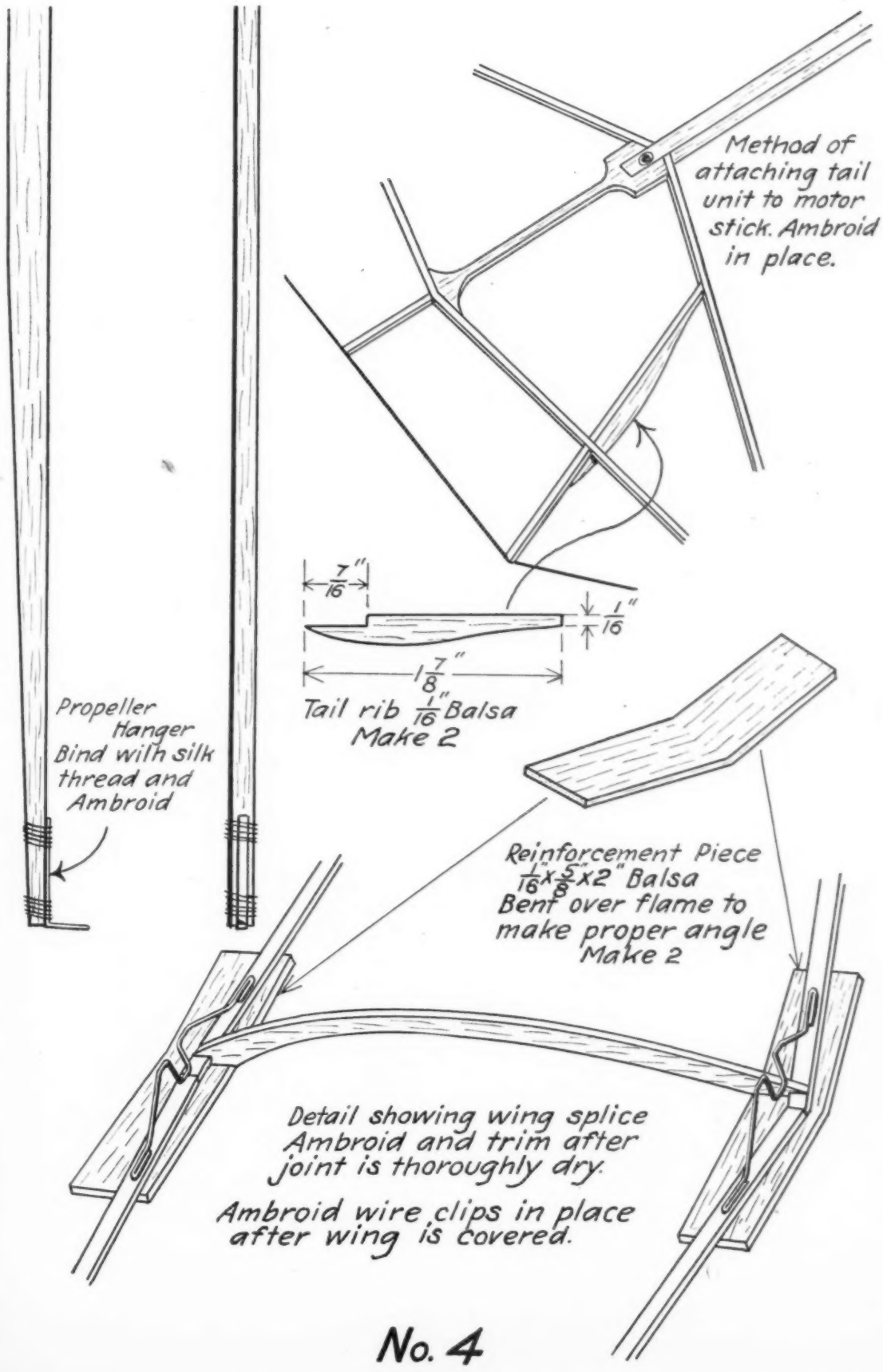


Propeller Shaft

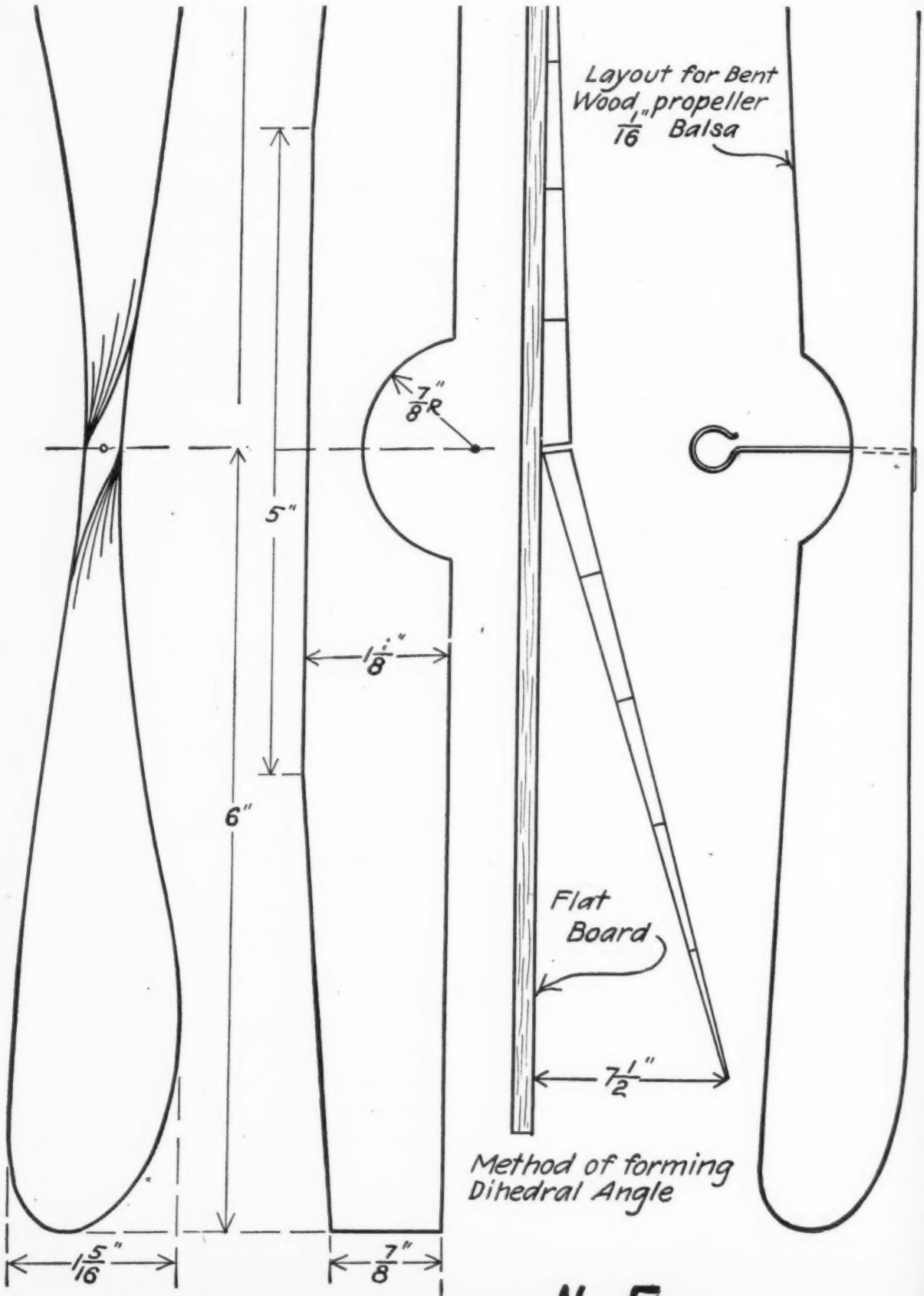





No. 3
Trailing Edge
Fine fish line
Ambroid in place
Motor Stick
Taper as
shown
3/16" X 5/16" X 17"
Hard Balsa
1/16" Sq. Balsa
Eylet
for Rudder
1/16" X 5/8" Balsa cut
out as shown
1/16" Sq. Balsa
1/16" Reed Tips
Bend as shown
Make 2
Join No. 4
here
STABILIZER


Method of attaching tail unit to motor stick. Ambroid in place.
7/16"
1/16"
1 7/8"
Tail rib 1/16" Balsa
Make 2
Propeller Hanger
Bind with silk thread and Ambroid
Reinforcement Piece
1/16" x 5/8" x 2" Balsa
Bent over flame to make proper angle
Make 2
Detail showing wing splice
Ambroid and trim after joint is thoroughly dry.
Ambroid wire clips in place after wing is covered.

No. 4



Carved Balsa Propeller

No. 5

The American Sky Cadets

Reporting the Curtiss "Robin" Contest and the Canadian Coliseum Tournament

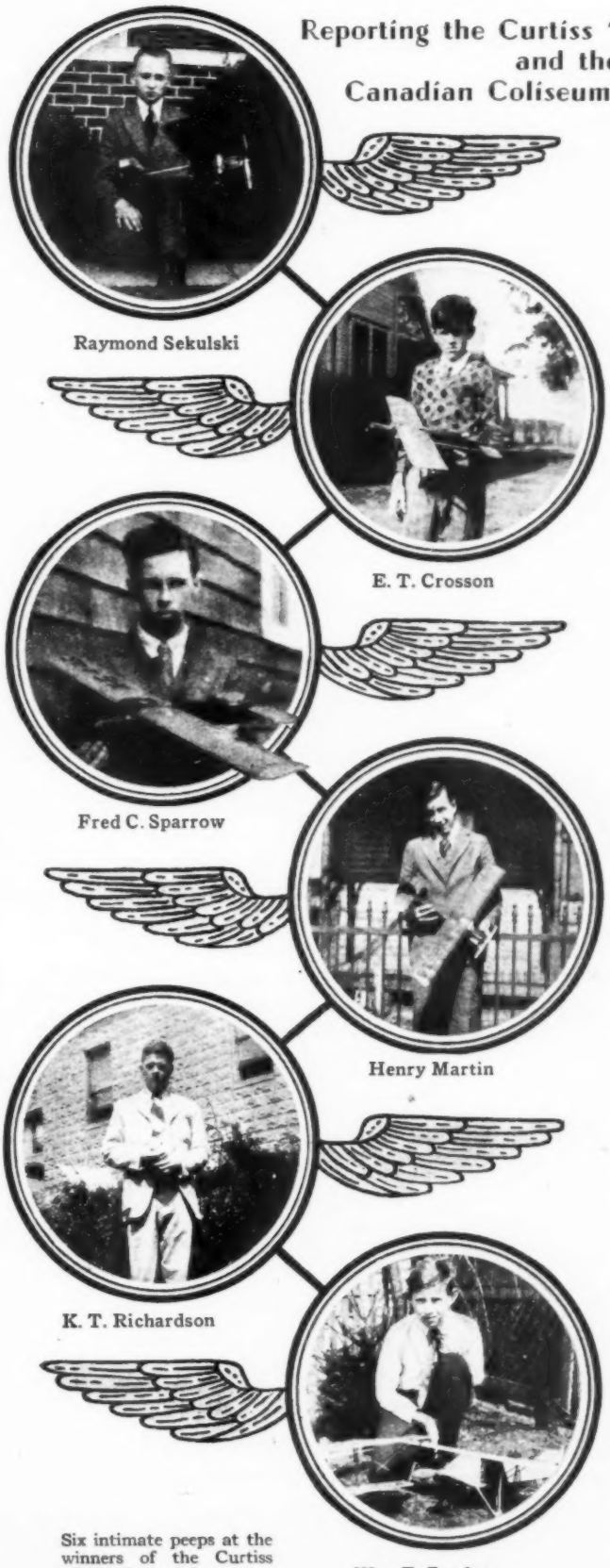
TWO new scale-model records were created in the recent All-America Curtiss "Robin" tournament under the auspices of the American Sky Cadets and MODEL AIRPLANE NEWS. The first record created was the number of entries submitted — totaling more than 300, and the second record, actual models received for judging, was seventy-two.

The number of models received far outnumbered those submitted for the national meet at Detroit last year, and this fact pays ample tribute to the enormous growth in the model airplane industry during the past few years.

Entries were received from every State in the Union except Nebraska and Wyoming, and entry blanks were submitted from as far North as Canada and from Cuba.

An idea of the excellence of craftsmanship of the builders can be gleaned from the fact that the judges needed eight hours in which to reach their final decisions. Virtually every model submitted was a prize-winner at its face value, but many competitors had failed to follow the specifications as outlined in the rules.

Many lost points on the question of coloring. Some lost because of raggedness of finish in general, but in all it is no exaggeration to say that the judges were hard put to find the winning model. This was submitted by Raymond Sekulski, of Harrisburg, Pa., and was awarded eighty-seven points.



Raymond Sekulski

E. T. Crosson

Fred C. Sparrow

Henry Martin

K. T. Richardson

Wm. F. Zander

Six intimate peeps at the winners of the Curtiss "Robin" model contest

Unquestionably the outstanding model submitted was that of William Leonard Grunstra, of Clifton, N. J. His model was a Curtiss "Robin" to every detail. Unfortunately for Grunstra it was decided by the judges that his model did not come under the rules of the contest proper. However, the contest committee agreed that Grunstra should be awarded a special prize.

Immediately after the contest many of the models were put on display in various parts of New York City.

The winning model and several others that received honorary mention were put on display in the aviation department at Gimbel's store. With these models were shown the prizes.

Other models were displayed at the Packard automobile showrooms, the Addressograph Company's windows, the Warren-Nash showrooms, Hearn's store, Stern's store, all in New York, and at Bamberger's store in Newark, N. J.

Many of the models, with the permission of their owners, were entered for the scale-model contest held under the auspices of the American Sky Cadets in connection with the monster New York Air Salon at Madison Square Garden. Results of this contest and the flying and endurance contests in connection with the show are not at hand as we go to press.

"ROBIN" PRIZE WINNERS

The full list of prize winners in the "Robin" contest:

FIRST PRIZE: Raymond Sekulski, Harrisburg, Pa.
SECOND PRIZE: E. T. Crosson, Dallas, Texas.
THIRD PRIZE: Fred C. Sparrow jr., New London, Conn.
FOURTH PRIZE: Henry Martin, Scranton, Pa.
FIFTH PRIZE: K. T. Richardson, Castle Shannon, Pa.
SIXTH PRIZE: William F. Zander, Cleveland, Ohio.
SPECIAL PRIZE: William L. Grunstra, Clifton, N. J.

HONORARY MENTIONS

Louis Alario, 5103 W. North Ave., Chicago, Ill.
Anthony Angelo, 609 Ave. B., Schenectady, N. Y.
Allen Autery, 2917 Mayfield St., Alton, Ill.
William Baker, 3892 Glendale St., Philadelphia, Pa.
Beorgevin Becksted, 5336 Addison St., Chicago, Ill.
John Bednarz, 158 Bergen Ave., Clifton, N. J.
C. H. Brinkmeyer, 2607 Dulaney St., Baltimore, Md.
Bernard Collins, 66 Newark St., Providence, R. I.
Herman Columbia, Brooklyn, N. Y.
William H. Coughlin, 227 Warren Ave., E. Providence, R. I.
Vernon Erlandson, 5825 Byron St., Chicago, Ill.
John Fallon, 133 Charles St., Floral Park, N. Y.
Bernard T. France, 2317 Logan St., Rockford, Ill.
Alfred Hovsepian, 2322 Stuart St., Berkeley, Calif.
Jerome F. Huber, 3637 Ward St., Chicago, Ill.
Clifford Jamison, 2005 Adolin Ave., Fresno, Calif.
A. Kowalski, 2648 Haddon Ave., Chicago, Ill.
W. Kulczak, 139 Marlboro St., Chelsea, Mass.
William W. Lee, 102 Essex St., Lawrence, Mass.
Robert Lindvall, 1322—4th Ave., Rockford, Ill.
Howard Linke, 80 East 235th St., Bronx, N. Y.
Theo Munson, 176-44—103rd Ave., Springfield, L. I.
William H. Neeley jr., 244 So. Cecil St., W. Phila., Pa.
N. B. Norton, R. F. D. 3, Clinton, Maine
Harold Popham, 106 W. 109th St., New York, N. Y.
Robert Powell, 953 N. W. 3rd St., Miami, Fla.
Reginald Rice, Prencton, Ky.
Edward A. Rich, 84 Oneco St., Norwich, Conn.
L. Stewart Rivers, 2554 S. Millick St., W. Phila., Pa.
R. C. Robertson, 1423 Northcliffe Road, Syracuse, N. Y.
John Romary, Burlington, Kansas
John Russo, 1758 Popham Ave., New York, N. Y.
Frank Sacks, 936 Market St., Marcus Hook, Pa.
Charles Schelcher, 7028—72nd Place, Glendale, L. I.
William Leonard Schmidt, 1363—5th St., Milwaukee, Wisconsin.
Charles Schwaninger, R. F. D. 3, Syracuse, N. Y.
Howard Scott, 4817 W. Adams St., Chicago, Ill.
Alfred Sibila, 216 Park Ave., So. W., Canton, Ohio.
Walter Silva, 2349 Davidson Ave., Bronx, N. Y.
Charles Todd, 11 Albermarle Ave., Hempstead, L. I.
John Trunk jr., 214—7th Ave., Clarion, Pa.
Alfred Vogel, 510 Chambers St., Milwaukee, Wisconsin.
Roger Vore, Box 87, Merriam, Kansas
Philip O. Vulliet, 617—16th Ave., No., Seattle, Washington.
T. H. Ward, Clinton, Maine
Walter Welsch, 2659 Marion Ave., New York, N. Y.
George Wilson, 144 W. Lippincott St., Philadelphia, Pa.
Tullio Grade, 2203 Belmont Ave., Bronx, N. Y. (special honorary mention).

A view of entries in the "Robin" contest lined up for judging. In the circle above is shown the board of judges; (left to right), Lieut. F. M. Hopkins, Capt. H. J. Loftus-Price (holding the winning model) and Cadet Col. Albert Fregosi

TORONTO COLISEUM CONTEST

Now for some news of model building enthusiasts across the Canadian border.

Though it is not generally known, there is considerable model airplane activity in Canada, and clubs have been formed in many parts from Halifax to Vancouver.

Canadian boys as a whole are taking a keen interest in aviation and derive great pleasure and aerodynamical instruction from building and flying model aircraft.

Much of the credit for the present stage of progress of this interesting and instructive hobby is due to the Model Aircraft League of Canada, ably assisted by the Boy Scouts and Y. M. C. A.

Many model airplane meets have been held and more are scheduled for 1930, with Toronto apparently holding forth as the center of activities. The Toronto Flying Club, a real airplane organization, also is doing much to help model aircraft enthusiasts, and the officials of the club willingly act as judges and timekeepers for the contests in and around the city.

One of the chief and most recent tournaments was that held at the Toronto

Cameragrams

"Casey" Jones gives a talk on models to members of the Boy's Club of New York, which was founded by E.H. Harriman. Left to right, Mr. Jones, Walter Gotfreed, Steve Remete and Stephen Neleshnick

Coliseum, and among the prizes for which were flights in a DH-Gypsy "Moth". The contest was considered one of the best ever held in Toronto.

Among the leading model builders in Toronto is E. Stallon, of Taunton Road. Thanks to him the following final results in the Toronto Coliseum tournament were made available. The results are:

ENDURANCE 16 TO 20

First—Arnold Rose, Central Y. M. C. A., 2.26-1/5.
Second—Allan Jackson, Broadway Y. M. C. A., 2.24.
Third—Evan Briggs, Jarvis Collegiate, 2.15.
Fourth—Albert Levy, North Toronto Collegiate, .40.

ENDURANCE 14 TO 15

First—Archie Skelton, Broadview Y. M. C. A., 3.23.
Second—William Campbell, Central Y. M. C. A., 3.08.
Third—Richard Hiscocks, Jarvis Collegiate, 2.57.
Fourth—Jack Purvis, Broadview Y. M. C. A., 2.24.

ENDURANCE 13 AND UNDER

First—Gordon Loates, 2.17.
Second—Joe Purvis, Broadway Y. M. C. A., 2.13.
Third—George Reed, Broadview Y. M. C. A., .38.
Fourth—Roy Adams, Wilkinson School, .28.

SENIOR R. O. G. 16 TO 20

First—Allan Jackson, Broadway Y. M. C. A., 2.20.
Second—Joe Jordon, Central Y. M. C. A., 2:19.
Third—Albert Levy, North Toronto Collegiate, 2.07-1/2.
Fourth—Arnold Rose, Central Y. M. C. A., 2.07.

SENIOR R. O. G. 14 TO 15

First—Fred Sheridan, North Toronto Collegiate, 2.44-1/5.
Second—Jack Purvis, Broadview Y. M. C. A., 2.15.
Third—William Campbell, Central Y. M. C. A., 2.11.
Fourth—Herbert Nott, North Toronto Collegiate, 1.52-1/5.

SENIOR R. O. G. 13 AND UNDER

First—Joe Purvis, Broadview Y. M. C. A., 2.27.
Second—George Reed, Broadview Y. M. C. A., 1.50-4/5.
Third—Kenneth Reed, Queen Victoria School, .54.
Fourth—Stewart Munro, Broadview Y. M. C. A., .46.

JUNIOR R. O. G. 16 TO 20

First—Albert Levy, North Toronto Collegiate, 2.05.
Second—Lawrence Regan, North Toronto Collegiate, 2.01-4/5.
Third—Richard Thompson, Central Y. M. C. A., 1.32.
Fourth—Allan Jackson, Broadview Y. M. C. A., 1.30.

JUNIOR R. O. G. 14 TO 15

First—Jim Chamberlin, Broadview Y. M. C. A., 1.54-1/5.
Second—Jack Buck, Broadview Y. M. C. A., 1.50-4/5.
Third—Harry Burrows, Danforth Y. M. C. A., 1.48-2/5.
Fourth—Ed. Morritt, Broadview Y. M. C. A., 1.39-1/5.

JUNIOR R. O. G. 13 AND UNDER

First—Harry Wenger, North Toronto Collegiate, 1.36-3/5.
Second—J. Purvis, Broadview Y. M. C. A., 1.34.
Third—George Reed, Broadview Y. M. C. A., 1.25.
Fourth—Gordon Loates, 1.09-1/5.

COMMERCIAL

First—William Campbell, Central Y. M. C. A., 1.52-2/5.
Second—Jim Chamberlin, Broadview Y. M. C. A., 1.33.
Third—Fred Sheridan, North Toronto Collegiate, 1.17-1/2.
Fourth—Alfred Long, Broadview Y. M. C. A., 1.14-4/5.

Flights in a "Moth" plane were won by Joe Purvis, one hour. Fifteen-minute flights by Archie Skelton, Jim Chamberlin, Gordon Loates, Arnold Rose and Fred Sheridan.

WINGS of VALOR

Jimmy Eludes his Captors and the Mad Chase in the Skies Goes On

By
JACK D'ARCY

He shrieked a warning through the whistling wind

JAMES WEBSTER, a mail pilot, is kidnaped en route from Salt Lake City to Cheyenne. His son, James jr., starts out in another plane to look for his father and passes a biplane flying toward Salt Lake City. Jimmy waves to the stranger but gets no response.

After an unsuccessful search, Jimmy returns to the flying field and finds everybody greatly excited about a message which had been dropped from a plane. This reveals that the missing pilot is being held for ransom of ten thousand dollars. There is the further startling news that the plane will return in the night and drop instructions for the payment of the ransom.

Jimmy pleads with the superintendent of the field to be permitted to follow the plane if it should reappear. Consent is finally given and he is in readiness when the plane swoops down to drop the second message.

Jimmy follows the plane until it is almost dawn and succeeds in making a difficult landing, still in pursuit. A light glimmers through the trees and he makes his way to it. He comes to a cabin in the woods and as he peers through a window, is attacked from behind and dragged inside. There he discovers his father, also a prisoner.

CONSCIOUSNESS slowly returned to Jimmy Webster. He moved almost imperceptibly, then nearly choked as he inhaled deeply of the smoke-laden atmosphere of the room. His eyes opened slowly and blinked dully as they came in contact with the brilliant morning sun which streamed through the window over the bunk. For a moment his senses were in a daze. Then, as he heard voices, the events of the past twelve hours slowly came back. He closed his eyes again and listened alertly to the conversation which came to his avid ears.

"If you think I'm going to quit now, you're crazy." Jimmy recognized the voice as that of the bearded man. "I'm not going to all this trouble and expense for nothing."

"Well, what are we going to do?" asked another.

"I've got a plan," said Blackbeard. "We'll leave Joe here to look after these guys, and the rest of us will go out and pull the same stunt on the afternoon mail plane. Maybe they'll come to terms quicker when they find we've got two of their planes and three of their men."

Jimmy noted that Scar-face was speaking now. "Do you mean that we should capture today's mail ship, and bring it and the pilot here, too?"

"Exactly," said Blackbeard. "We've got too much at stake to quit now. Furthermore, the most effective thing to do is to strike again. Then, if they're con-

The three planes passed virtually wing to wing

sidering what to do, that ought to hurry them up."

"Say," interrupted one of the gang. "Can't we continue this discussion outside? It's too smoky in here."

There was a murmur of assent and Jimmy, through half closed lids, saw the four men file out of the door into the sunshine of the clear day beyond.

As soon as the last figure had passed the portal, Jimmy turned eagerly to the huddled form beside him. For a moment the eyes of father and son met. Jimmy felt the blood race through his veins, and a strange emotion surged through him as he saw the bound and gagged figure that he loved so well. His father gazed at him from proud, grateful eyes. Jimmy pushed his lips up to his father's ear.

"Dad," he breathed.

His father nodded his head vigorously to indicate he heard.

"Listen," said Jimmy. "We'll have to make a break for it. Three of them are going off in the ship. One will be left to take care of us. We'll get him and follow them in my plane."

Again his father nodded his head. Jimmy shot a swift glance about the room to make sure that he was unobserved, and then, plunging his hand into his coat pocket, withdrew his staunch pocket knife. In a moment his father's gag slipped from his mouth, and his bonds lay loosely on the bunk. For a silent moment they gripped hands firmly. But before they could exchange words, the familiar pounding of a slowly running motor came to their ears.

"They're off," said Jimmy. "Lie still till our jailer comes back. At the first opportunity we'll rush him."

"I'll rush him," corrected Webster senior. "You've done enough. You stay behind till I get him."

Jimmy nodded a reluctant assent.

Again that roaring sound of the plane outside came to their ears, then gradually grew fainter.

"There they go," said Jimmy's father. "The other one ought to be back soon."

Even as he spoke, the man called Joe sauntered into the doorway. He shielded his eyes from the sun with his hand and gazed up into the clouds following the flight of his companions in crime.

Jimmy's father slowly threw his cramped legs over the side of the bunk. Cautiously, he measured the distance between himself and the bandit with a practised eye.

"Careful," whispered Jimmy in his ear. "He probably has a gun."

"He won't get a chance to use it," replied his father grimly.

Silently the mail pilot stretched his feet out and for the first time in twenty-four hours stood upright. After a preliminary flexing of his aching muscles he tiptoed across the floor toward the enemy who, unconscious of the threat behind him, still gazed into the cerulean heights of the spring morning.

A LOOSE board in the floor creaked. The man in the doorway spun round on his heel. But before he had divined what was coming, the mail pilot was upon him. Webster sprang like an enraged lion at his guard. His powerful right arm flashed out and found its mark on the point of his adversary's jaw. The man crumpled and fell.

"Quick, Jimmy," cried his father. "Where's your ship?"

Jimmy dashed from the bunk and ran out of the door.

"Down here," he called excitedly. "Follow me."

The pair of them ran over the soft mountain soil. As he hurried toward the ship, Jimmy glanced anxiously into the sky for some sign of the bandit's plane. A feeling of triumph swept over him as he espied a small gray dot far over toward the east.

"There he is," Dad," he yelled.

His father nodded but, conserving his wind, essayed no reply.

Suddenly the plane loomed before them. Svelte and shining in the morning sun. Jimmy, who was in the lead, sprang into the cockpit and turned to assist his father in the plane.

His father, some twenty feet behind, called to him.

"Get her warmed up." *(Continued on page 58)*

A Course in Airplane Designing

By Mastering This Valuable Course, the Model Builder of Today Lays the Cornerstone for His Career as the Aeronautical Engineer and Designer of Tomorrow

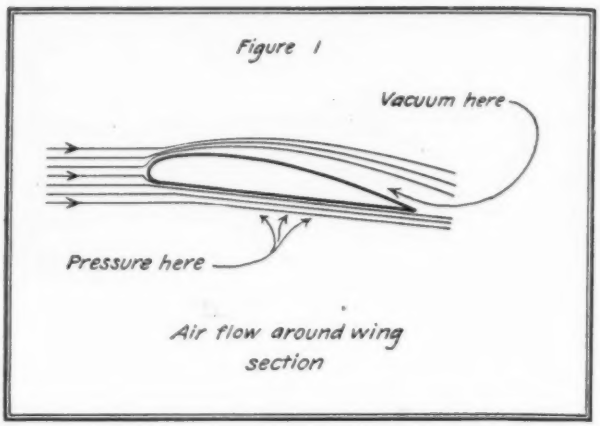
Article 8.

By KEN SINCLAIR

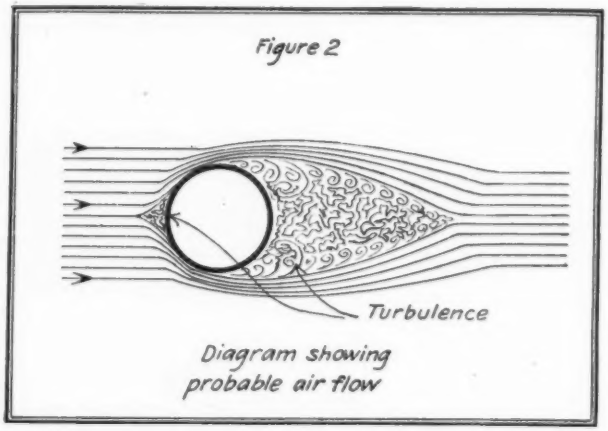
IN presenting this course, MODEL AIRPLANE NEWS *wishes to stress the fact that model building is more than a mere sport. If the builder of model airplanes learns the fundamental principles underlying airplane flight and design, he prepares himself for a future career in the most profitable phase of aviation.*

The policy of MODEL AIRPLANE NEWS *is not to encourage or teach its readers to become pilots, but rather to become aeronautical engineers, designers, salesmen, manufacturers, or equip themselves for any other positions which require the training of the specialist or executive. Study this course from month to month, master it in every detail and you will gain a fundamental knowledge of the how and why of airplane design which will be second to none.*

THE EDITOR.



BY this time I hope that many of you are asking yourselves some rather embarrassing questions concerning flight. Just why does a wing provide lift when it is moved through the air? What causes drag? Why does a streamlined body have much less drag than a round one? Why is the blunt edge of the streamline used for the entering edge, and the sharp edge for the trailing edge?

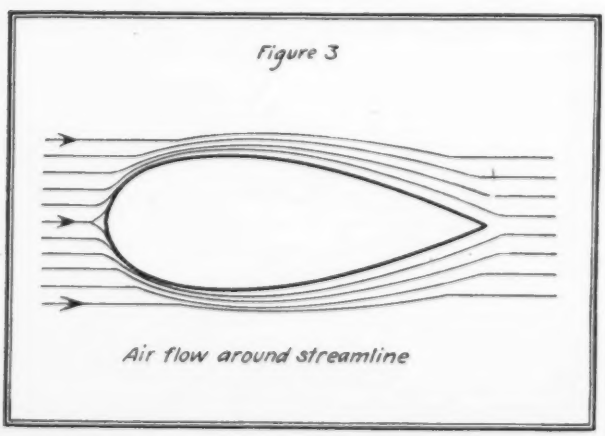


These questions, and many others, will occur to one who studies aerodynamics. There is a good reason for everything that goes on in this world of ours, and our task is to get to the very bottom of the problem of air flow, in order that we may learn just how and why an airplane behaves as it does.

First of all we must have some conception of the real nature of the air. We have lived at the bottom of the ocean of air for so long a time that we have become oblivious of its very existence. Nevertheless, the air about us is a tangible substance, having a definite set of physical properties.

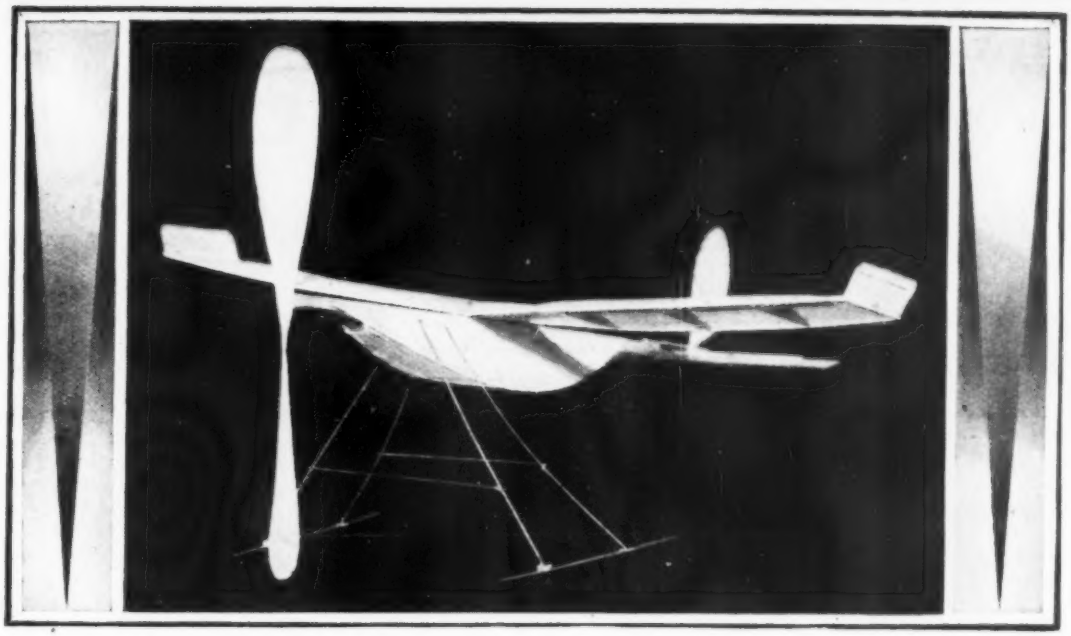
Air is a mixture of gases. It is composed chiefly of nitrogen and oxygen, with many other gases in smaller amounts, and, since it is composed of gases, it behaves like a gas itself.

Scientists have learned that a gas moves, or flows, in nearly the same manner as does a fluid. Because we cannot actually see the air, we must apply our knowledge of fluid motion to air flow if we wish to reach a conclusion about the way the air will flow about a certain body. This comparison has been found fairly accurate.



AIR, being a definite substance, has weight and mass. That it has weight we can easily deduce from the fact that the air presses down upon us with a pressure of fifteen pounds per square inch. Not only does air have weight, but also it occupies space, as does anything that exists. These two facts, often overlooked, are the basis of all flight.

In order that we may see how the properties of air are the basis of flight, we must make use of certain laws of physics. Somewhat more than two hundred years ago Sir Isaac Newton set forth some very important statements that have since been accepted as laws. The ones that concern (*Continued on page* 61)



How to Build
A Flying Tanager Ski Model

A Neat Plane Launchable from Water, Snow, Ice or Land

By H. Debosky

HERE is a model that will rise from water, snow, ice or any other smooth surface and will fly for one and one-half to two minutes under its own power, at a speed of about four miles an hour.

First thoroughly study the layout sheet and specification list. As you will note, detail A on list of materials calls for a propeller, material — balsa wood, size 11", number required — one. Detail B calls for motor stick, material — balsa wood, size 1/8" x 1/4" x 15", number required— one. This is a simple method of identifying the various parts and their proper places, and there should be no trouble in building the model.

Build each part—fuselage, stabilizer, main wing, propeller, etc.—separately. Do not hurry.

Necessary Materials

A —1 piece	3/8" x 5/8" x 11"	balsa	propeller
B —1 piece	1/8" x 1/4" x 15"	balsa	motor stick
C —2 pieces	1/16" x 1/16" x 14"	balsa	fuselage frame
D —2 pieces	1/16" x 1/8" x 10-1/2"	balsa	front spar (main wing)
E —2 pieces	1/32" x 1/16" x 10-1/2"	balsa	rear spar (main wing)
F —7 pieces	See Plans	balsa	rib (main wing)
G —2 pieces	See Plans	balsa	wing ends (main wing)
H —1 piece	1/16" x 1/8" x 5-3/8"	balsa	stabilizer extension
I —2 pieces	1/16" x 1/16" x 7"	balsa	front and rear spars (stabilizer)
J —5 pieces	1/32" x 1/32" x 2-3/8"	balsa	stabilizer ribs
K —1 piece	See Plans	bamboo	rudder
L —4 pieces	1/32" x 1/32" x 7-1/2"	bamboo	landing gear struts
M—2 pieces	1/32" x 1/4" x 7"	bamboo or balsa	landing skids
N —2 pieces	1/64" x 1/64" x 4-3/4"	bamboo	strut braces
O —2 pieces	1/32" x 1/16" x 2-13/16"	balsa	wing ends (rib main wing)
P —2 pieces	1/16" x 1/16" x 1-3/8"	balsa	fuselage bottom cross braces
Q —2 strands	1/32" x 3/16"	rubber	motor
R —1 piece	Number 8	piano wire	propeller shaft
S —1 piece		piano wire	rear motor hook
T —1		bearing	propeller
U —		washers	propeller
V —2 pieces	1" diameter x 1/8"	balsa	wheels
W—1 piece	1/32" x 1/16" x 3"	balsa	rudder cross brace
X—1 piece	See Plans	balsa	pontoon
Y —2 pieces	See Plans	piano wire	wing clips

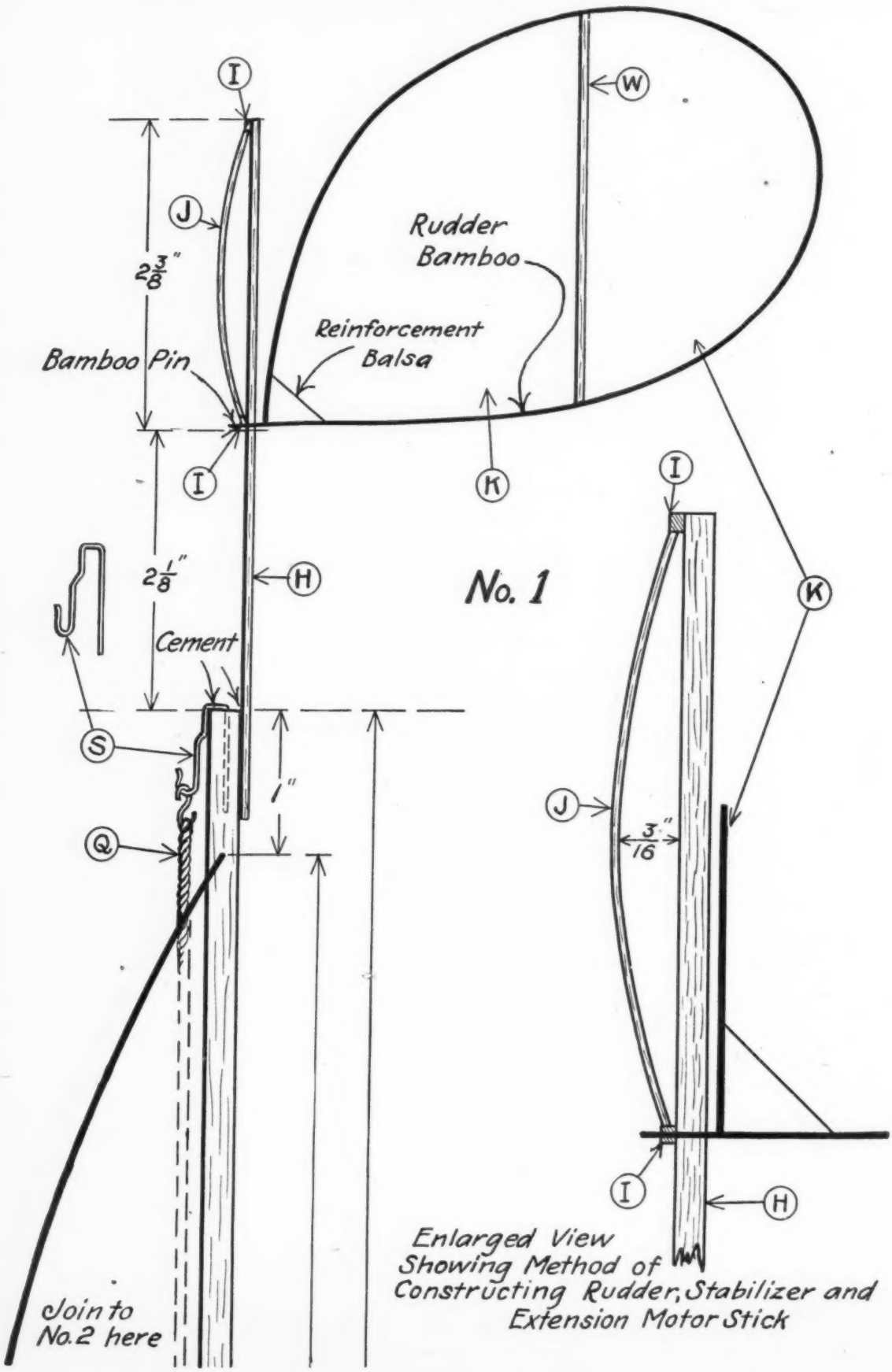
See Plans on Pages 34 to 39

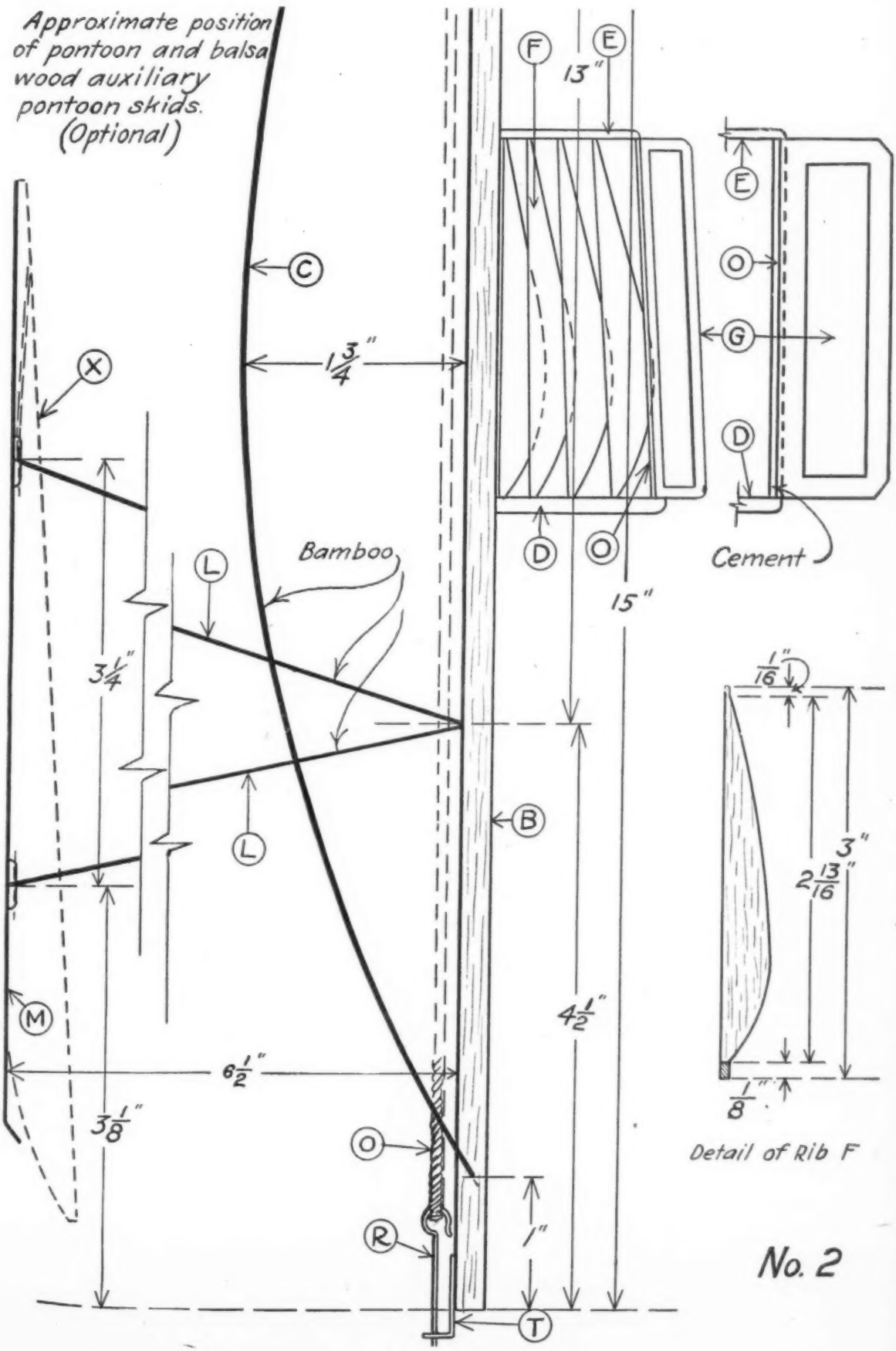
FUSELAGE

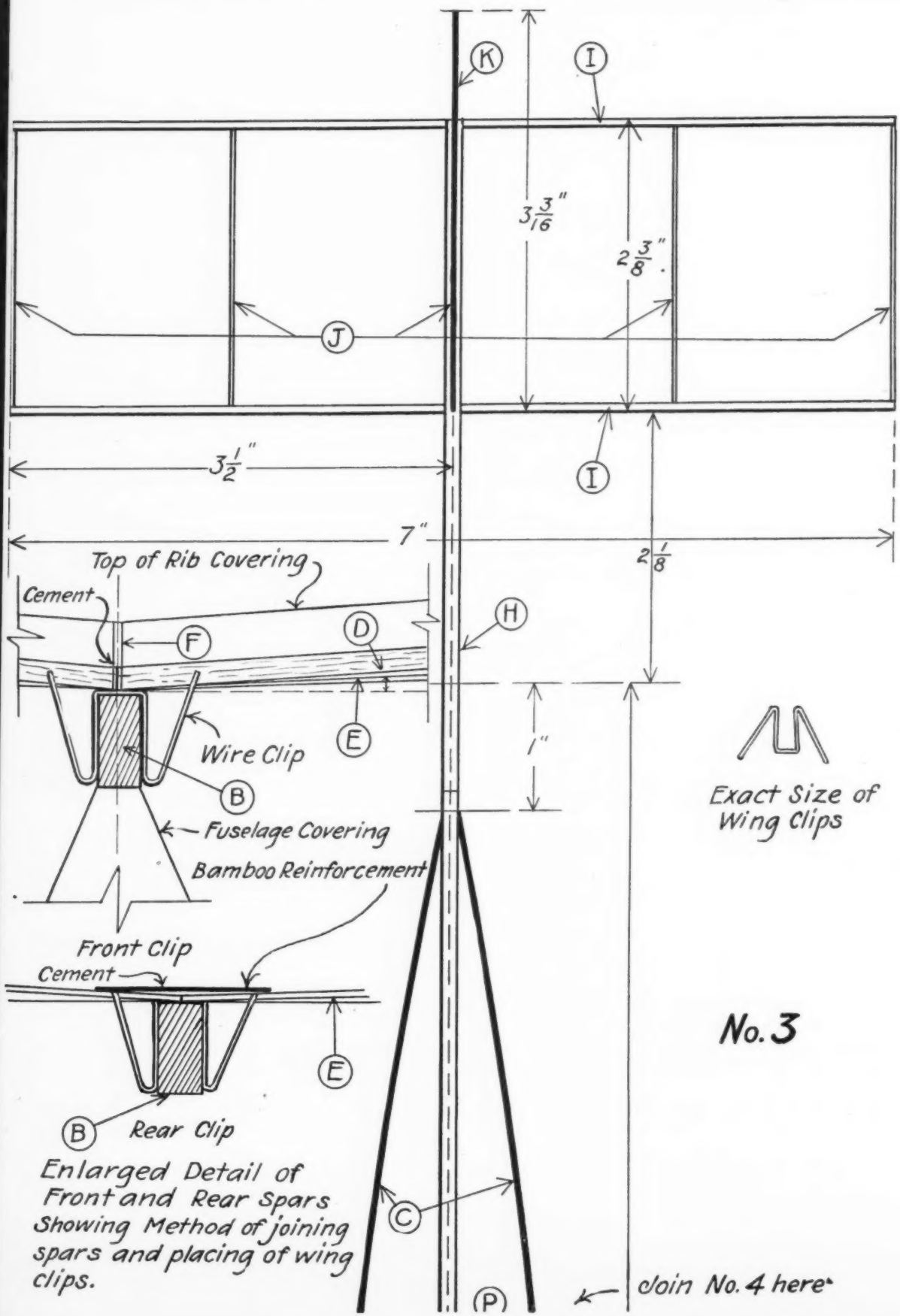
The fuselage is a triangular shaped body and is composed of motor stick and two fuselage frame sticks and is easily built. Detail B is the motor stick, the size of which is 1/8" x 1/4" x 15" and is of balsa wood. Measure off from each end of stick 1". Take the two pieces of balsa wood, detail C, which are known as fuselage frame sticks and size of which is 1/16" x 1/16" x 14".

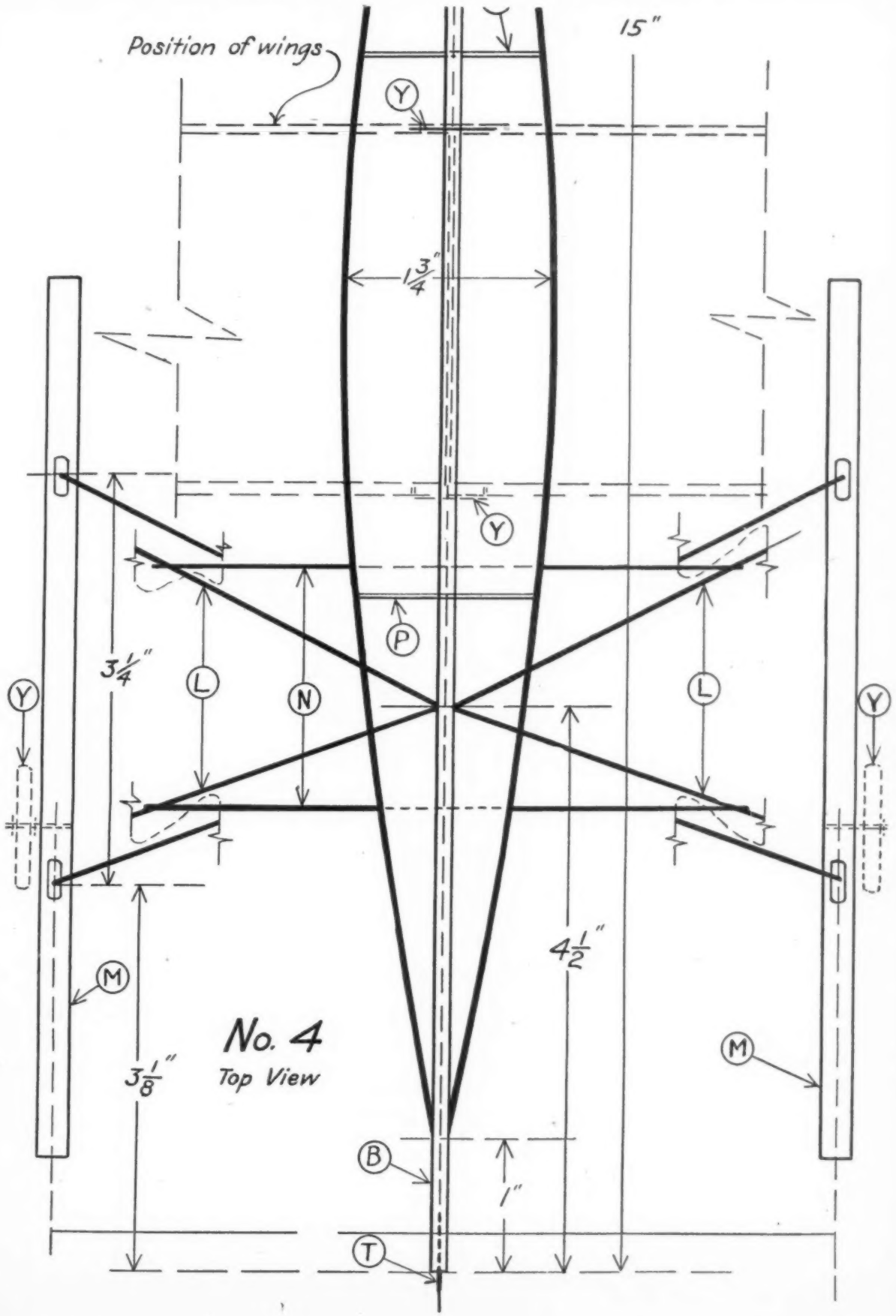
Take two pins, lay stick on layout sheet and bend fuselage frame sticks to position shown in side view on drawing. The distance of fuselage frame sticks from the bottom of the motor stick and the exact center of this bend should be 1-3/4". Pin in place and cement ends. Repeat the same on the other side. Before cement is dry spread fuse-

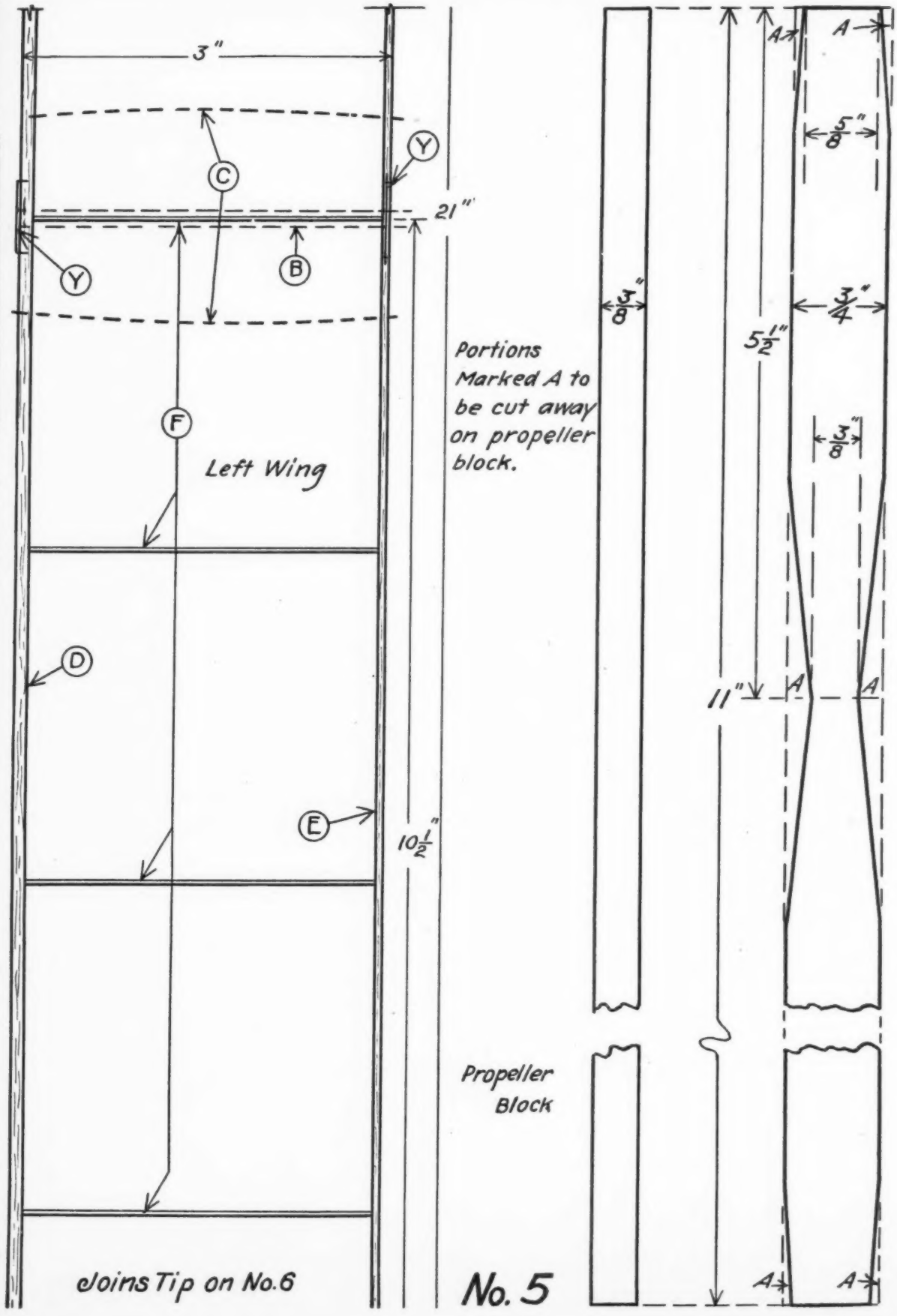
(*Continued on page 56*)

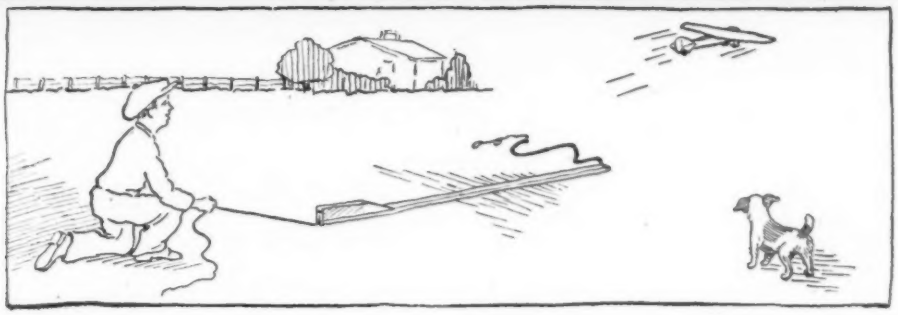

I
J
2 3/8"
Bamboo Pin
I
2 1/8"
H
Cement
S
1"
Q
Join to No. 2 here
W
Rudder Bamboo
Reinforcement Balsa
K
No. 1
I
K
J
3/16"
I
H
Enlarged View Showing Method of Constructing Rudder, Stabilizer and Extension Motor Stick


Approximate position of pontoon and balsa wood auxiliary pontoon skids. (Optional)
F
E
13"
E
O
G
D
C
1 3/4"
X
D
O
Cement
15"
L
Bamboo
3 1/4"
L
B
M
6 1/2"
3 1/8"
4 1/2"
O
R
1"
T
1/16"
3"
2 13/16"
1/8"
Detail of Rib F
No. 2


K
I
3 3/16"
2 3/8"
J
3 1/2"
I
7"
2 1/8
Top of Rib Covering
Cement
F
D
H
E
1"
Wire Clip
B
Fuselage Covering
Bamboo Reinforcement
Front Clip
Cement
E
B
Rear Clip
Enlarged Detail of Front and Rear Spars Showing Method of joining spars and placing of wing clips.
C
P
Join No. 4 here
Exact Size of Wing Clips
No. 3


Position of wings
15"
Y
1 3/4"
Y
P
3 1/4"
L
N
L
Y
Y
4 1/2"
M
No. 4
Top View
3 1/8"
M
B
1"
T


3"
C
Y
21"
Y
B
F
Left Wing
D
E
10½"
Joins Tip on No.6
No. 5
Portions Marked A to be cut away on propeller block.
A
A
⅝"
⅜"
¾"
5½"
⅜"
11"
A
A
Propeller Block
A
A



A Catapult for a Model Glider

Easily Made and Effecting a Realistic Take-Off

By GUS MEINS

AN effective device which will add realism to your glider model is a catapult designed to work much in the manner of a sling-shot. The illustration shows it hurling the glider into the air like a missle and amply demonstrates its simple construction.

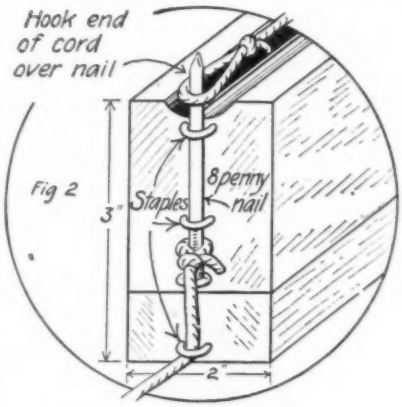
There is great fun to be derived in making such an unusual device and greater still will be the enjoyment in launching your glider in workmanlike fashion.

First to be constructed is the main board.

This consists of one piece of one inch pine, two inches wide and six feet long. Now take another piece of the same wood, 2″ x 2″ x 12″ long, and taper at one end. Careful study of Fig. 1 will illustrate the first step in the process of construction.

Next will be needed a piece of large size airplane rubber about six feet long.

Double this over to make two strands three feet long. Fasten to this a strong piece of cord about one foot long, at the end of which a loop has been made. Nail the other end of the rubber to the end of the board. Fig. 1 illustrates this step also.

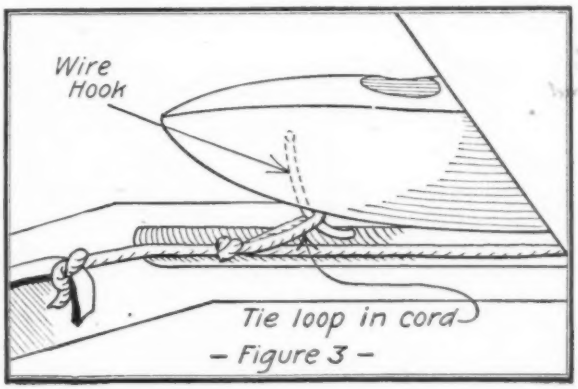


Now you are ready to go on to the stage demonstrated in Figure 2. Take two wire staples and drive into the end of the board. Then secure an eight-penny finish nail, to which fasten another long cord, and place through the staples, also shown in Fig. 2.

Now take the cord fastened to the rubber and stretch back until the loop can be hooked over the end of the nail. Consult Fig. 2 again to see if this has been done correctly.

It would be well at this time for the builder to go back to the beginning and make sure that this catapult board is made exactly as the directions and illustrations have shown.

When it is found that they correspond to every detail, place your glider model on the board, as shown in Fig. 1. Make a loop in the cord where the wire hook of the glider is found. Now hook the loop as illustrated in Fig. 3.



– Figure 3 –

The builder is now ready to put his catapult to the test in actual practice.

By jerking the cord which pulls on the nail, the rubber will be released and the glider will take off to the air. If one wishes to obtain a longer glide with his model, the tension of the rubber can be increased and greater duration of flight thus effected.

It is a practical certainty that, if the builder has followed the directions carefully and taken particular care to see that his materials are of good quality, the catapult will prove successful.

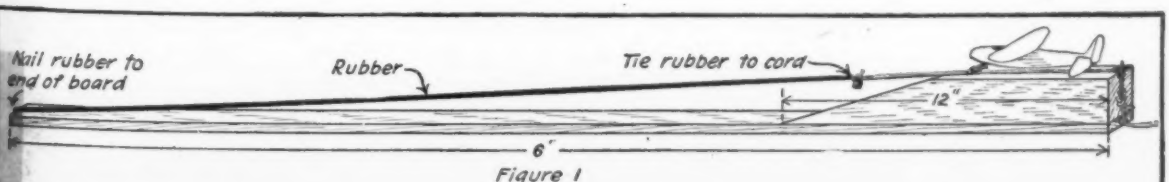
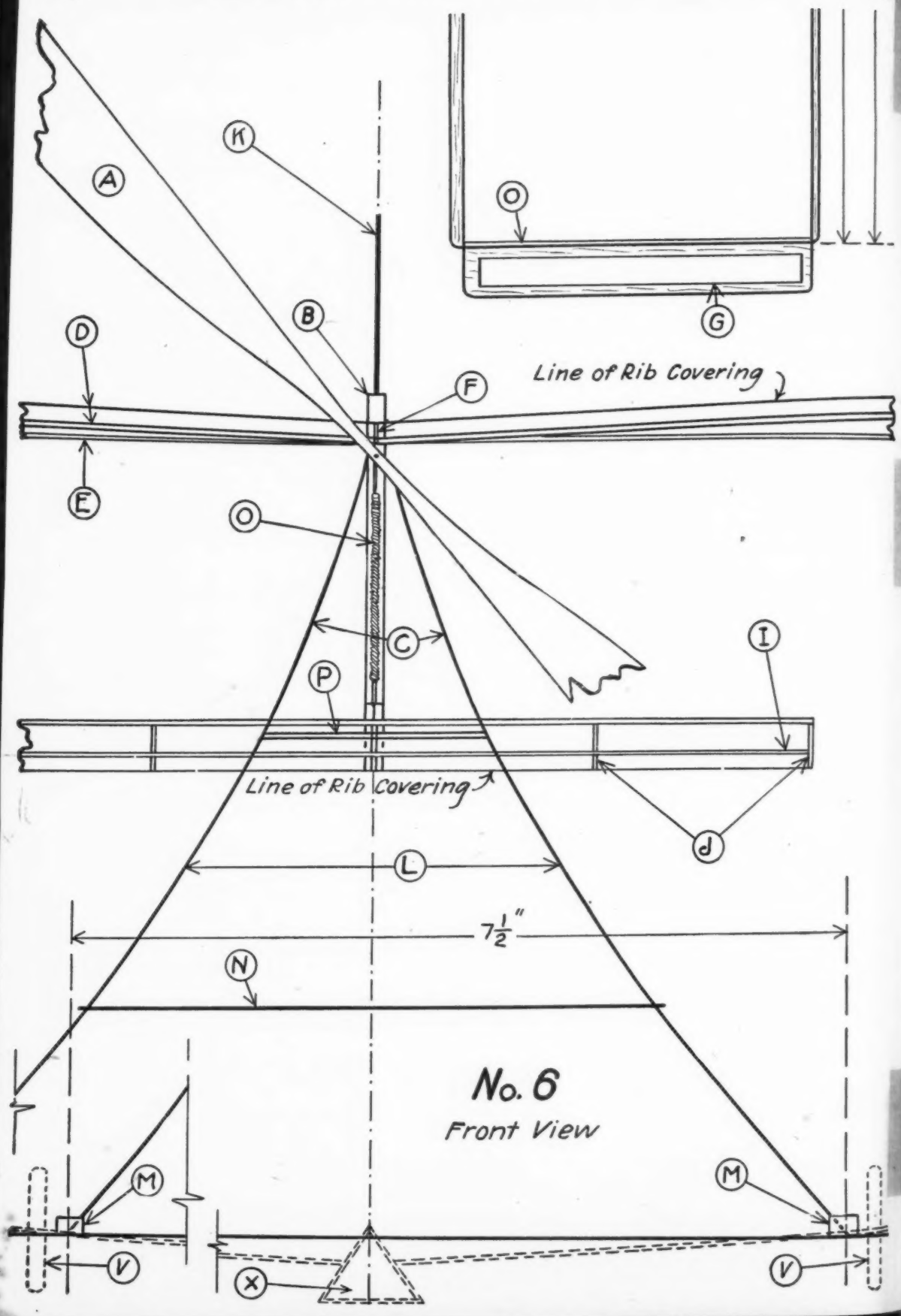


Figure 1



No. 6
Front View

HOW TO BUILD
A Flat Bottom Row Boat

With a Few Tools and Patience—
A Wonder Craft for Vacation Time

By E. F. FURTH

THE thought of summer time brings visions of camp and a cool, winding river or a pretty lake; what better to add to the picture than a flat-bottom row boat? Such a water craft is within the ability of any boy to make, being much simpler than a round bottom boat in construction, and will add immeasurably to the happy days of vacation time.

Before beginning to work, make sure that all material is free from loose or shaky knots, cracks or other imperfections that are liable to cause leaks.

Get a pair of strong trestles and a 2″ plank 16′ long. Place the plank on the trestles and start to lay off 6″ from the left hand end. Follow drawing K. This means to measure 36″ from the 6″ mark on the outside of the stern and place a block 21/2″ thick. On top of this block place form A with the long edge down. Fasten this to the block and plank with two 1″ x 2″ cleats. Then measure off 30″ and place a block 3″ thick.

Over this place form B with the long edge down. Fasten. Next measure off 30″ again and place a block 21/2″ thick, placing over it form C. Measure off 30″ again and place a block 2″ thick. Over this place form D. 54″ from this is the outside of the stern, marked E on the drawing. From the outside of the stem to the outside of the stern at the center of the plank should measure 15 feet. Check measurements with the plan to see if they are correct before proceeding further. The blocks under forms A, B, C and D are to give the shape at the gunwale line.

Take the 1″ x 8″ x 14′ 4″ bottom board and tack it to the forms and stern exactly in the center to stiffen the forms. Take the 1″ x 16″ x 16′ side boards marked J on the drawing and shape them according to drawings. Then tack them to the forms and attach to the stem and stern with brass screws. Plane the edges of these boards where the bottom boards will attach to them so that the latter will fit snugly and not leave any opening on the outside. Fasten the bottom boards and the side boards together, using brass screws.

Attach the keel, using brass screws.

NEXT come the ribs and floor timbers. These are the 1″ square oak strips. In laying out for the ribs and floor timbers, follow drawing M. This gives the exact locations of all of these. Fasten all ribs and floor timbers to boards with 2″ nails.

Fasten the 1″ x 2″ x 16′ strips that are for the seat rests 6″ from the top of gunwale to the top of these strips, using screws. Attach the seats to these strips with screws at the locations given on drawing M. Attach also the small bow deck, oar lock blocks and the strips under them, all with brass screws.

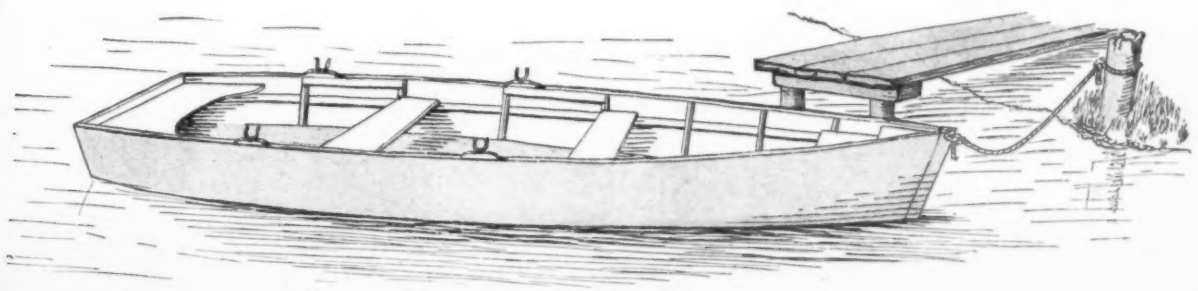
Along the whole length of the boat at the top and on the outside of the side boards and the stern is a 1/2″ x 2″ strip called the fenderwale. Attach this with screws. The boat should receive at least two coats of paint on the inside and three on the outside. This will take two gallons of paint and one gallon of boiled linseed oil for thinning purposes.

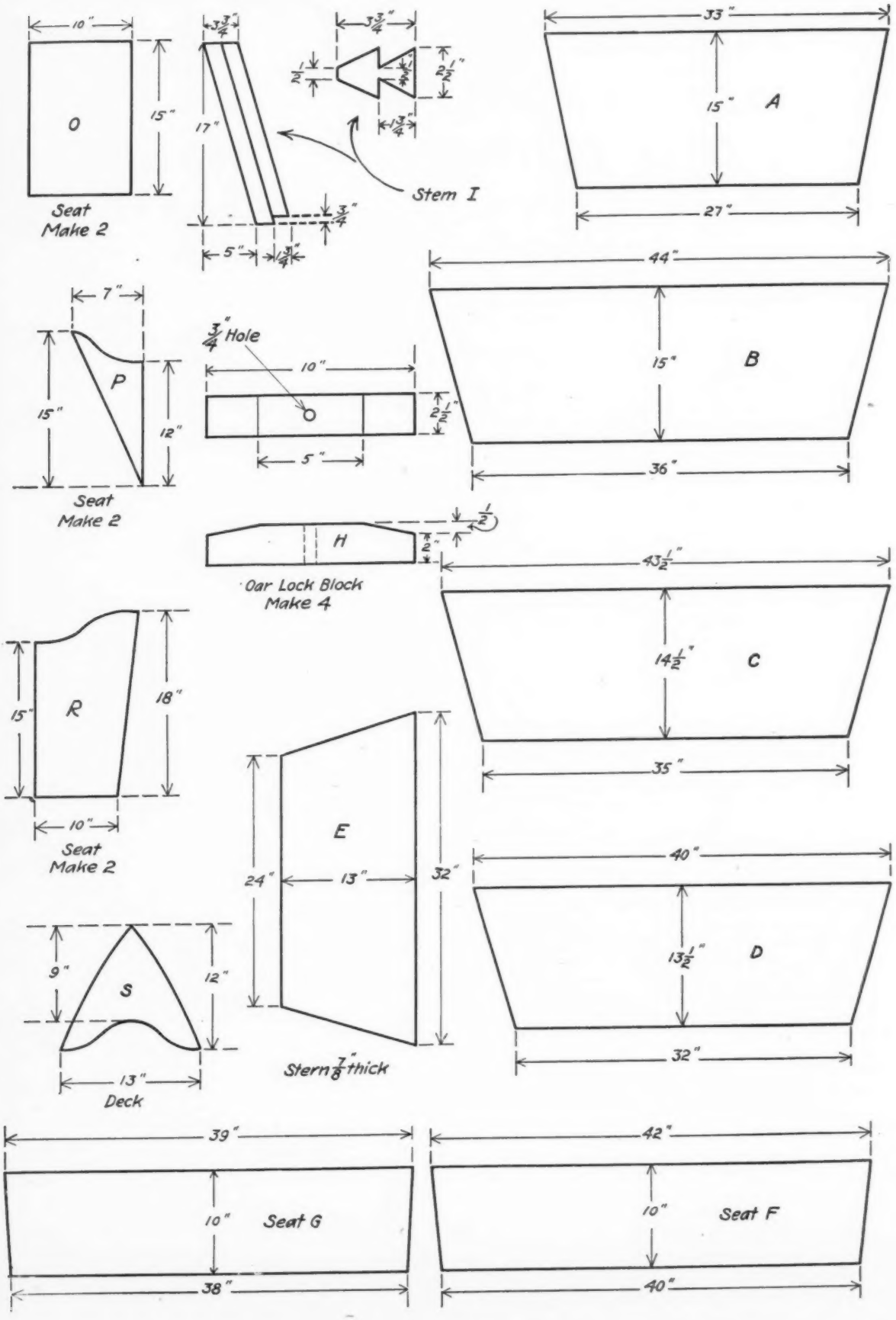
Be sure to caulk all joints on the bottom with oakum. Be sure that all joints are tight.

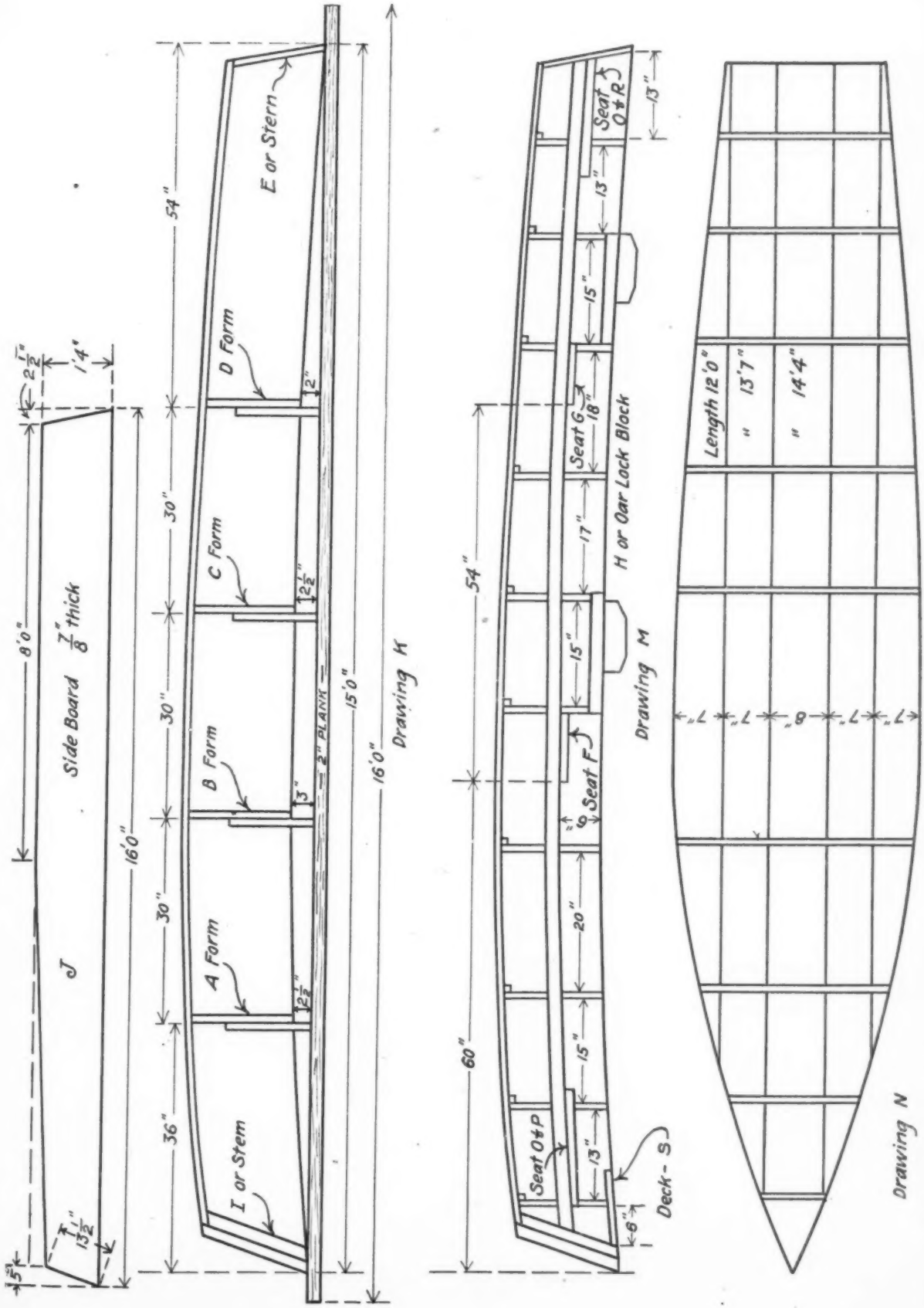
Necessary Materials

2 pieces	1″ x 16″ x 16′		sides
1 piece	1″ x 15″ x 33″		form A
1 piece	1″ x 15″ x 44″		form B
1 piece	1″ x 14-1/2″ x 43-1/2″		form C
1 piece	1″ x 13-1/2″ x 40″		form D
1 piece	1″ x 13″ x 32″		form E—stern board
1 piece	2-1/4″ x 3-5/8″ x 17″		form I—stem
1 piece	1″ x 8″ x 14′	4″	center floor board
2 pieces	1″ x 7″ x 13′	7″	next to center floor boards
2 pieces	1″ x 7″ x 12′		outside floor boards
2 pieces	1″ x 2″ x 16′		underseat strips
2 pieces	1″ x 10″ x 15″		seats O
2 pieces	1″ x 7″ x 12″		seats P
2 pieces	1″ x 10″ x 18″		seats R
1 piece	1″ x 10″ x 39″		seat G
1 piece	1″ x 10″ x 42″		seat F
1 piece	1″ x 12″ x 13″		deck S
4 pieces	2-1/2″ x 2-1/2″ x 10″ oak		oar lock blocks H
4 pieces	1″ x 2″ x 15″		oar lock blocks supports
4 pieces	1″ x 2″ x 17″		oar lock blocks supports
2 pieces	1/2″ x 2″ x 16″		fenderwale
1 piece	1″ x 4″ x 15′ oak		keel
4 pieces	1″ x 2″ x 8′		slat floor
4 pieces	1″ x 2″ x 12′		slat floor
48 feet	1″ square oak		ribs, floor timbers

See Plans on Pages 42 and 43




10"
O
15"
Seat
Make 2
3¾"
17"
5"
1¾"
¾"
Stem I
½"
2½"
1¾"
33"
15"
A
27"
44"
15"
B
36"
7"
P
15"
12"
Seat
Make 2
¾" Hole
10"
2½"
5"
H
½"
2"
Oar Lock Block
Make 4
43½"
14½"
C
35"
R
15"
18"
10"
Seat
Make 2
E
24"
13"
32"
Stern ⅞" thick
40"
13½"
D
32"
9"
S
12"
13"
Deck
39"
10"
Seat G
38"
42"
10"
Seat F
40"


J
Side Board 7/8" thick
8'0"
16'0"
2½"
1'4"
13½"
1½"
15"
E or Stern
D Form
C Form
B Form
A Form
I or Stem
54"
30"
30"
30"
36"
2" PLANK
12"
2½"
2½"
3"
15'0"
16'0"
Drawing H
Seat O#R
13"
13"
15"
Seat G
18"
17"
H or Oar Lock Block
15"
Seat F
20"
15"
13"
Seat O#P
Deck - S
6"
54"
60"
Drawing M
Length 12'0"
" 13'7"
" 14'4"
7" 7" 8" 7" 7"
Drawing N

MACFADDEN AVIATION ADVISORY BOARD

Conducted by
Capt. H. J. LOFTUS-PRICE
(Ex-Royal Air Force)

CHAIRMAN OF THE BOARD

SOME more good news for you glider enthusiasts this month. The Bowlus Sailplane Co., Lindbergh Field, San Diego, Calif., have notified me that they have complete sets of blueprints with instructions on the Bowlus glider for those who wish to construct their own gliders.

Incidentally, the Bowlus glider, so far as is known, is the only glider in use at present and eliminates the necessity of buying or training in the secondary type of motorless craft.

—o—

And now in response to numerous questions concerning age requirements for mechanics' licenses, the Department of Commerce has placed the minimum age requirement for any class of mechanic's license at eighteen years. The action of the Department is embodied in an amendment to section 66 of the Air Commerce Regulations through the addition of the following paragraph:

(E) The minimum age requirement for any class of mechanic's license is eighteen (18) years.

When the air-commerce regulations were drawn up several years ago, the minimum age requirement for any class of mechanic's license was purposely omitted, because at that time there was no precedent to guide the Department of Commerce, and those drawing up the regulations did not wish to place any undue burden on the industry or the mechanics.

Since that time, experience has shown that the minimum age requirement of eighteen years is the lowest that can be permitted while keeping in mind the highly important part the mechanic plays in the safe operation of aircraft and the need for mature judgment and the constant display of vigilance.

—o—

Another matter which has been in the minds of many readers is that of the examinations for various types of pilot licenses. The questions outlined below bear ample tribute to the stress laid by the Board for some time on the question of education as affecting success in aviation.

Mr. Gilbert G. Budwig, Director of Air Regulation, Washington, D. C., recently announced the compilation of 250 questions which illustrate the wide scope covered in the written examinations for the various types of licenses. Examples of the questions applicants must answer follow:

May an unlicensed pilot in an unlicensed craft carry pay passengers from one state to another?

Is it necessary for an airplane bearing an advertisement to be licensed if flown between states?

What is the minimum altitude in flying over a football game?

May acrobatics be performed with passengers for hire?

How do you recover from a tail spin and how do you tell when a machine is about to spin?

How is the effect of propeller torque counteracted in the rigging of an airplane?

What are the advantages and disadvantages of dihedral in an airplane?

State the possible causes for the following: nose heaviness, left wing heaviness, excessive vibration.

Name three causes for a loss of oil pressure.

Name four reasons for an air-cooled engine to overheat, though the lubrication system be functioning perfectly.

Name the four basic types of clouds.

What causes bumpy air?

Why is it dangerous to fly close to thunder heads?

Your compass course is 274 degrees, the deviation is 4 degrees west, the variation 3 degrees west. What is your true course?

How would you know if the wind shifted while you were flying a compass course from one town to another?

What method is used to protect the inside of steel tubing in a fuselage against rust?

How do you "track" a propeller?

Define stagger wire, thimble, turtle back, walking beam, routed spar.

What is the rule regarding overtaking aircraft?

What day markings are required on airship mooring cables.

What is the international radio distress signal?

How many coats of dope should be applied to the fabric of a newly covered wing?

What are convection currents?

"The questions," Mr. Budwig said, "clearly show that the requirements for a Department of Commerce pilot license call for a broad knowledge of the subject of civil aeronautics, including the Air Commerce Regulations, the Air Traffic Rules, airplanes, airplane engines, meteorology, and navigation. In addition to the written examination, applicants are required to pass the necessary physical and practical flying tests. If an applicant cannot pass the written examination, even though he has learned to fly under an unlicensed status, he is indeed working under a great handicap which may result disastrously.

—o—

The Junkers D-38, for which claim is made that it is the largest land plane in the world, is of all-metal construction, chiefly duralumin. The D-38 is 75 ft. long, has a wing span of 147 ft. and fully loaded weighs 52,800 lbs. Carrying a useful load of 9,840 lbs., it has a range of 2,170 miles and is driven by four engines totaling 2,400 h.p. The machine can carry thirty or more passengers, and their accommodation is divided between the fuselage and the inner wing routes, which are more than 8 ft. at their maximum depth.

In this respect, comparison with the new Fokker F-32 might not be out of place. The F-32 has a wing spread of 99 ft. and nose to tail is 79 ft. 10 in. Its four motors develop 2,300 h.p. and it carries thirty passengers, pilot and co-pilot.

Below is continued our list of World War aces:

French—living (continued)

Capt. Heurteaux	21
Lieut. Deullin	20
Capt. Pinsard	20
Lieut. Coeffard	15

(*Continued on page* 54)

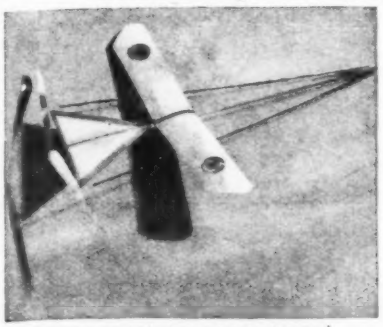
EACH month the Macfadden Aviation Advisory Board will endeavor to answer all questions concerning model building and aviation in general. Address all questions to

The
Macfadden Aviation Advisory
Board,
MODEL AIRPLANE NEWS
1926 Broadway,
New York City

Enclose with your letter a self-addressed and stamped envelop to facilitate an answer, as space is limited and all letters can not be answered in these pages.

Because We Want Every Boy

to have a Moskito Model we are passing on the benefit of these reduced prices made possible by our tremendous production



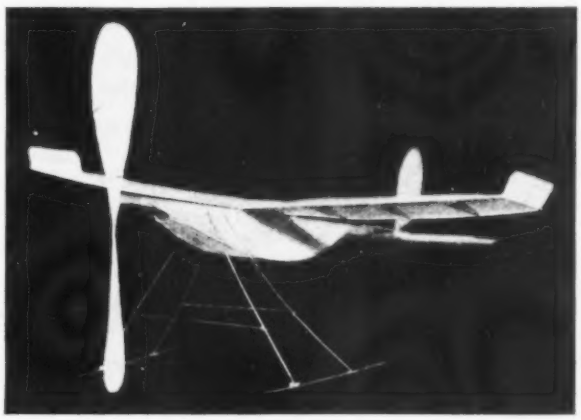
TWIN PUSHER

$2.25 *Postpaid*

Flies 10 minutes and many hundred feet. All balsa construction. Wing spread 30". Weight 2-3/4 oz.—can be lightened. You can be as sure the Moskito Twin Pusher will outfly any other model as you are that there will be a flame when you strike a match.

Most complete kit on market. Two blank balsa propellers—right and left — with kit. Free winder, dope, cement. Wire fitting all formed. Wing ribs cut to fit and wing curve proven. You'll get a $100 worth of fun out of this $2.25 model. Easy and simple to construct with full size layout sheet. If you want fun, this is your model.

MOSKITO SKIPLANE TANAGER—$1.00 P. P.



This safety model, first shown at Buffalo Air Show is R.O.G., R.O.W., and will rise off snow or ice when properly equipped with wheels or pontoons. Can tow Baby R.O.G. (shown below) through. Duration of 1½ minutes has been attained with this model. Will *not* dive, tailspin or ground loop because it uses newly discovered safety principles. Complete kit contains bentwood prop, extra propeller blank, all wood cut to fit, cement, dope, fittings already made, etc. Also full size blueprints. Everything to make this amazingly stable, long flying, safety model, the best plane you ever built.

Read these Startling Prices

Orders less than $.50 not filled ***All prices postpaid***

Large Tubes Aero Cement		.15 each
2 oz. bottles Aero Dope		.20 "
2 oz. bottles thinner		.20 "
Cement in Cans—2 oz.		.25 "
Small tubes cement		.10 "
Bottles Banana Oil with brush		.10 "
Sheets Japanese Tissue Paper	21 x 25"	.05 "
Sheets Japanese Bamboo Paper	24 x 36"	.14 "
Sheets Cellophane	12 x 24"	.12 "
Sheets Three Ply Veneer	12 x 24"	.30 "

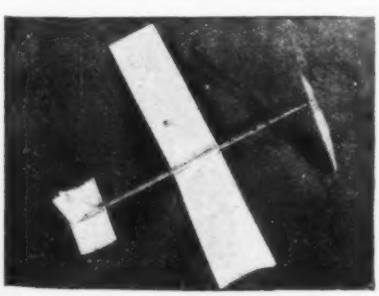
Following strips of rubber in lengths of 25 and 100 feet—

1/16 x 1/32"	.01 per foot
1/16 x 1/16"	.01 " "
1/8 x 1/8"	.02 " "
1/8" flat	.01 " "
3/16" flat	.01 1/2 "
Pcs. No. 60 Drill Wire 36" long	.10 each
Piano Wire, 10 ft. rolls	.01 per foot
Spools of Steel Hair Wire	.10 each
Pcs. Flat Bamboo each 15" long	.02 "
Fittings—Envelopes containing the following—1 propeller hanger, 1 shaft, 1 small wing clip, 1 large wing clip, 1 wire can, 1 rear hook, two washers, two bearings	.10 per pkg

Winders			.30 each
Packages Aluminum Powder			.10 "
Washers			.10 per pkg.
Bearings			.10 " "
Propeller Blocks (Shaped)	6" long		.08 each
" " "	7" "		.10 "
" " "	8" "		.12 "
" " "	9" "		.14 "
" " "	10" "		.16 "
" " "	11" "		.18 "
" " "	12" "		.20 "
" " "	16" "		.28 "
Bentwood Propellers	6" long		.12 "
" "	7" "		.14 "
" "	8" "		.16 "
" "	9" "		.18 "
" "	10" "		.20 "
" "	11" "		.22 "
" "	12" "		.24 "
" "	16" "		.32 "
Balsa Wing Rib Sets			.35 per set
Balsa Entering Edge Sticks			.10 each
Small Wheels			.02 "
Medium Wheels			.03 "
Large Wheels			.05 "

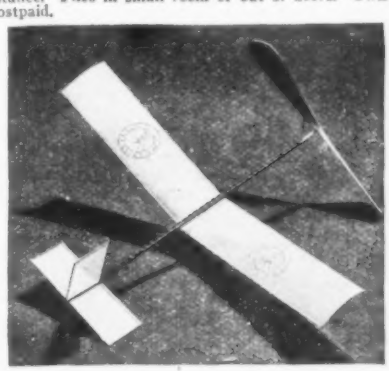
BABY R.O.G.—50c *Postpaid*

Sensation of Baltimore Aviation Show. Official Kit of American Sky Cadets. An actual unretouched photo of the Baby R.O.G. which made duration flight of four minutes before thousands of people. A sure contest winner. You must have one. Cannot be beaten at twice the price. Get it today—50c.



MOSKITO FLIER—$1.00 *Postpaid*

Record Endurance model. Five minute flights or more easy with our special propeller and new kind of wing construction. Kit absolutely complete full sized layout. Free extra propeller. Wire fittings bent ready to use. Aero dope and cement. Balsa construction throughout. Adjustable for height or distance. Flies in small room or out of doors. Own a Moskito Flier—$1.00 postpaid.



GET BOTH FOR $1.25 Use coupon below for this combination offer of Baby and Flier together for $1.25. We may not repeat this offer again, so order today.

MOSKITO FLIER CO.
11 West 42nd St., New York City

Gentlemen:
Send me postpaid today: (mark article by X)
Money order enclosed.
☐Baby R.O.G. $ .50 ☐Moskito Flier—$1.00
☐Baby R.O.G. and Moskito Flier both—$1.25
☐Moskito Tanager—$1.00 ☐Twinpusher—$2.25

Name.....

Address.....

City and State.....

Boys!! *Model airplane contests are coming. Will you be ready??*

What Our Customers Say:

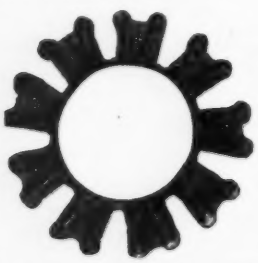
Newell Martin, Peabody, Mass., says:
"The Curtiss Hawk model equipped with skis, secured about 230 feet. I thought this good, as it took off the snow."

Evan Gammill, Nashville, Ark., says:
"Enough cannot be said for the Baby Tractor as a stunter."

Eugene Haynes, Winchester, Mass.
"I have three of your Baby Tractors. They fly wonderful. Send the following right away."

Nicholas Pastore, N. Y. C., says:
"I am greatly pleased with your wood and glue."

H. A. Basil, Sheridan, Mont., reports:
"Some time ago we bought the parts for a 24" Hawk. On the second flight we made a record of 592 feet."



Dummy Aircooled Motor
A very light celluloid nine cylinder motor for use on models with a wing span of two to three feet.
Price - - - - - $.60

Other Models We Sell
Junkers monoplane, record holding indoor and outdoor tractors, twin pusher, Fokker Universal, and others. All in our catalog.

When model plane builders want their supplies and sets sent quickly, they order from Hawthorne.

When they want material of the highest quality, with prices consistent with that quality, they order from Hawthorne.

When they want construction sets, plans and directions for planes that fly, that have broken records, and that have given much satisfaction to previous buyers, they order from Hawthorne.

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If you don't believe this, give us a trial, and we will convince you.

Specifications of Hawthorne Supplies

Our balsa wood is of the best quality, slightly above the specifications of the U. S. government. It is specially selected for absence of worm holes, knots, cross grain and other imperfections.

Our rubber, paper, wire, glue, dope, etc., is the same as used by the winners of the National contests in the past year, and is considered by many model builders as being the best obtainable.

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Hawthorne Model Supplies—Special

Large bundle various sizes of balsa wood, high quality, including flat wood, prop. blocks, long and short lengths, square wood, etc. A real buy. ..... $ .50

High grade pure gum rubber.
1/8" x 1/32" ..... one full skein $1.00

3/16" x 1/32" ..... one full skein. $1.50

Japan silk tissue, very light and strong, the same as used by experts. Size 20" x 25" per doz. ..... $ .40

Thrust bearings, new design, high carbon steel, in two sizes, small and large, for indoor and outdoor planes. Per dozen ..... $ .30

Celluloid wheels for models are very strong and light, besides being very realistic.

2" celluloid wheel. ..... per pair $ .30

1¼" wheel. ..... per pair $ .20

Ambroid cement. In 1 oz. tubes or 2 oz. cans. Price per lot of ten ounces $1.00

Airplane dope. In 2 oz. cans. Price per five cans. Plain dope for covering. ..... $ .80

Colored dope for doping plane (what color) $1.00

New 1930 Catalog and model plane book with many new ideas, plans, etc. ..... $ .10

Balsa Wood. Prices are on lots of Six. Length 24 Inches

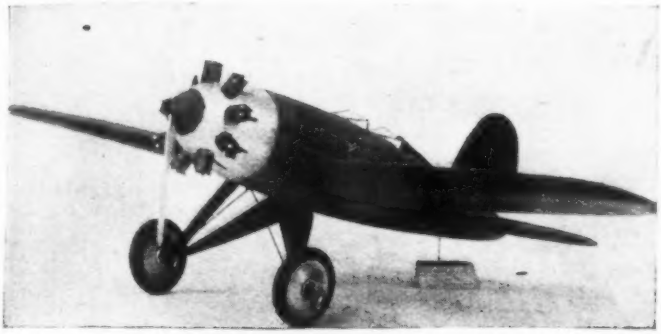
1/8" sq.	$.20
1/8" x 1/4"	$.20
1/8" x 3/8"	$.25
1/8" x 1/2"	$.25
1/4" sq	$.25
1/4" x 3/8"	$.25
1/4" x 1/2"	$.25
3/8" sq	$.30
1/2" sq	$.30
1/32" x 2"	$.30
1/16" x 2"	$.30
1/8" x 2"	$.35

1930 catalog and model book with plans, instructions, and ideas that have been the means of winning contests ..... *$.10*

HAWTHORNE MODEL AERO. CO.

DEPARTMENT M. :-: HAWTHORNE, N. J.

Hawthorne Models Are FLYING Models



Lockheed "Sirius"

2 Ft. (without N. A. C. A. cowling)

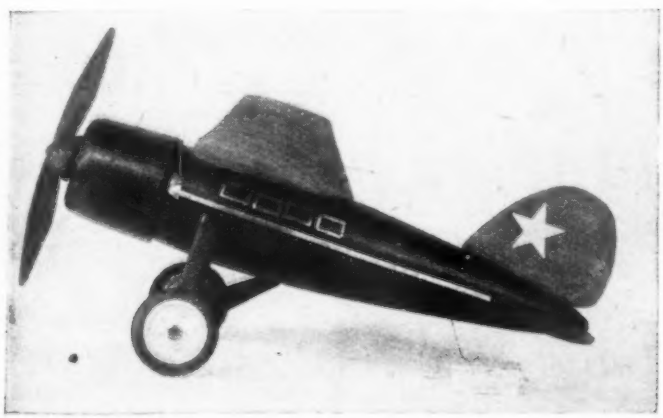
Lindbergh's Latest Plane

This newest creation of the famous Lockheed line makes an excellent flying model. With its streamlined rounded fuselage, tapered wing and absence of wing struts, it presents a clean, fast appearance seen in few planes.

The wonderful design and construction in the Lockheed has been put into the Hawthorne model with the result that in flying ability, strength and type of construction, the last word in up to date models is presented.

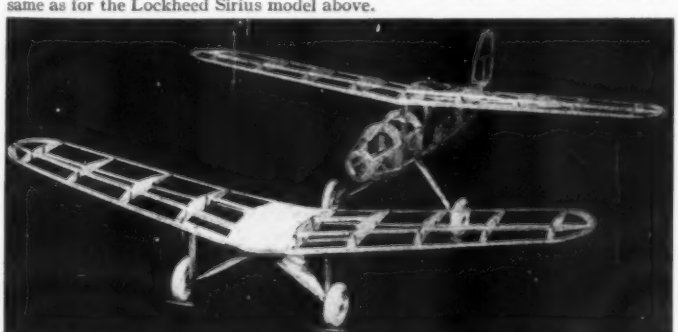
With this set is included cut out ribs, fuselage parts shaped, wire parts, wheels, radial motor parts, etc.

Construction set..... **$3.50**



Lockheed "VEGA" 2 Ft.

This famous North and South Pole plane used by Sir Hubert Wilkins, the Arctic explorer, is great for a model. The performance, construction set and price are the same as for the Lockheed Sirius model above.



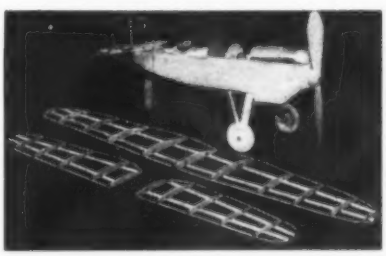
Actual photo of uncovered Lockheed Vega and Sirius wing and landing gear. As much work is already done, such as cut out ribs, formed body parts, wing mount block on Sirius, etc., the models are not hard to make.

TWO-FOOT CURTISS HAWK

This is a model of the fast pursuit plane flown by Army and Navy aviators. The weight of this plane is about two ounces, made mostly of balsa wood. Flights of 300 feet and 40 seconds have been reported from boys who have made this plane.

The set for this model contains all necessary parts, including celluloid wheels, cut out body sides, two colors of dope, bent wire parts, plan and directions, etc.

Complete construction set..... **$2.50**



CURTISS HAWK (Uncovered)

The Baby Tractor is the simplest model to make, and as it contains only just enough parts for flying, will outfly many a larger and more costly model. This model has been flown out of sight many times, under the right conditions, and when fairly well made will average about thirty to sixty seconds duration.

Construction set..... **$.50**

Hawthorne Model Airplanes

All Hawthorne planes are scientifically designed with flying ability as the first consideration. They contain all the latest improvements in design, and the best points of models that in the last year have won contests.

Hawthorne Model Airplane Supplies are made to satisfy the demands of the most exacting model builder. They are made of the best and lightest material and are used by many of the expert model builders and contest winners of this country.

All Hawthorne construction sets contain every necessary part to make the plane, with extra material included for possible mistakes. Hawthorne planes will fly well when made correctly. The construction used in the real planes is followed as far as possible, with any necessary changes made by expert model makers, in order to increase the flight of the plane.

A few features of Hawthorne planes are the celluloid wheels, which are the strongest and lightest for models; also two colors of airplane dope, included with all scale model type planes; the success had by boys who have built these planes.

HAWTHORNE MODEL AERO. CO.

DEPT. M **HAWTHORNE, N. J.**

A Famous Aviator's Message to You

"Casey" Jones

"Casey" Jones is one of the foremost men in aviation today. He is a famous war flyer, a world-renowned pilot and is now President of the Curtiss-Wright Flying Service—the "World's Oldest Flying Organization." "Casey" Jones knows airplanes! And here's his message to you:

"Boys of today have a great future before them, for whether they take up aviation as a career or not they will undoubtedly live in an age when airplanes and flying will be to America what automobiles are today. I am glad to see so many thousands of boys interested in flying and constructing and using model airplanes. Model airplanes not only provide a lot of fun, but they are an excellent means of studying the principles of flight. Model airplanes are now made with great care and craftsmanship, such as the Kingsbury Silver Arrow Flying Planes, which I have personally flown. These planes are expertly designed and constructed, and besides providing a lot of fun, their realistic flight action contributes a great deal to a boy's study of aviation." Signed: Charles B. Jones ("Casey" Jones).

'WAY OVER HOUSE TOPS!

Model No. 21

The Kingsbury *Silver Arrow* really flies! Launches by hand or "takes off" from ground. Long, continuous flights assured. Not a construction toy but fully built. A moment to assemble and it's ready to fly! Made of Balsa wood and aluminum; aluminum propeller; adjustable wings; strong elastic motor. Five models. Racing types —No. 1, wing spread, 18 in. $1; No. 2, wing spread, 26 in. $2; No. 3, (dual rudder) wing spread, 33 in. $3. Cabin types —No. 21, wing spread, 22 in. $2.50; No. 22, wing spread 26 in. $3.50 (West of Miss. $1.10, $2.20, $2.75, $3.30, $3.85.) If your dealer cannot supply you, send your order to us. Join Silver Arrow Club and become a Master Pilot.

Kingsbury Mfg. Company,
108-G Myrtle St., Keene, N. H.

KINGSBURY MOTOR DRIVEN TOYS

Send 10c for this novelty eraser. A steel disc wheel with a "balloon" tire of solid eraser rubber. Set of 4, 35c.

FREE! Kingsbury Moviescope! Twirling the leaves of this novelty book reveals a motion picture of Silver Arrow flying. Also shows 50 interesting Kingsbury Motor Driven Toys.

Dictionary of Aeronautical Terms

A. A. GUN Same as *anti-aircraft gun.*

AERO. Any vehicle used in the air.

AEROBOAT. Same as *seaplane.*

AERODONETICS. The science pertaining to climbing or soaring flight.

AERODYNAMICS. That branch of dynamics which treats of the laws of motion of the air and other gaseous fluids in connection with gravity and other mechanical forces.

AEROFOIL. Same as *airfoil.*

AEROGRAPHY. A written study of the atmosphere and its phenomena.

AEROMECHANICS. Same as *aerostatics* and *aerodynamics.*

AERONAUT. Same as *Balloonist* or *aviator.*

AERONAUTICS. The science and art pertaining to the flight of aircraft.

AEROPLANE. Same as *airplane.*

AEROSTAT. A generic term for aircraft whose support is chiefly due to buoyancy obtained by providing it with cells or bags filled with a gas which is lighter than air.
SYN.—Lighter-than-air craft. Includes *airship* and *balloon.*

AEROSTATICS. The science relating to the mastering of fluids which are lighter than air.

AEROSTATION. The art of raising and supporting aircraft by means of lighter-than-air fluids.

AILERON. A hinged or pivoted movable auxiliary surface of an airplane, usually part of the trailing edge of a wing, the primary function of which is to impart a rolling motion to the airplane.

AILERON CONTROL HORN. See *horn, aileron control.*

AIRBASE. The landing-field or operation center of airships.

AIR-BOMB. A bomb designed to be dropped by aircraft from a height.

AIRCRAFT. Any weight-carrying device or structure designed to be supported by the air, either by buoyancy or by dynamic action.

AIRDROME. A landing field for airplanes.

AIRFOIL. Any surface designed to be projected through the air in order to produce a lifting or directional effect.

AIR-LINE. The shortest distance in flight between two points.

AIRLOG. An instrument for measuring the linear travel of an aircraft relative to the air.

AIR-MINDED. Interested in aeronautics. Desiring knowledge of aeronautics.

AIRPLANE. A mechanically driven aircraft heavier than air, fitted with fixed wings, and functioning through the dynamic action of the air.

AIRPLANE, PUSHER. An airplane with the propeller or propellers in the rear of the main supporting surfaces.

AIRPLANE, TANDEM. An airplane with two or more sets of wings with substantially the same area (not including the tail unit) placed one in front of the other and on the same level.

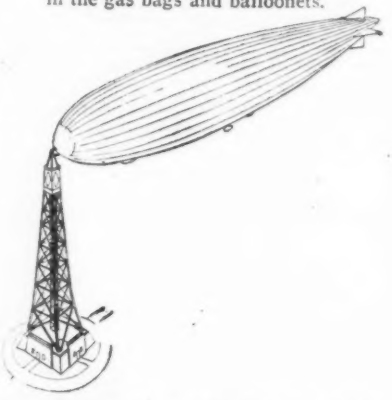
AIRPLANE, TRACTOR. An airplane with the propeller or propellers forward of the main supporting surfaces.

AIR-POCKET. Same as *pocket.*

AIRPORT. A locality, either of water or land, which is adapted for the landing and taking off of aircraft and which provides facilities for shelter, supply and repair of aircraft; or a place used regularly for receiving or discharging air passengers or cargo.

AIRSHIP. An aerostat provided with a propelling system and with means of controlling the direction of motion. When its power plant is not operating, it acts like a free balloon.
The term "airship" is sometimes incorrectly applied to heavier-than-air craft either in full or as "ship." This is a slang use of the word and should be avoided.

NON-RIGID. An airship whose form is maintained by the internal pressure in the gas bags and balloonets.



RIGID. An airship whose form is maintained by a rigid structure.

SEMI-RIGID. An airship whose form is maintained by means of a rigid or jointed keel in conjunction with internal pressure in the gas bags and balloonets.

AIR SPEED. The speed of an aircraft relative to the air. Its symbol is V. (Velocity).

AIR-SPEED INDICATOR. An instrument for indicating the speed of an aircraft relative to the air. It is actuated by the pressure developed in a suitable pressure nozzle or against a suitable obstruction and is graduated to give true air speed at a standard air density.
The speed indicted by the instrument is termed the "indicated air speed."

AIRWAY. An air route between air traffic centers, which is over terrain suited for emergency landings, with landing fields at intervals equipped with aids to air navigation and a communication system for the transmission of information pertinent to the operation of aircraft.

The term "airway" may apply to an air route for either landplanes or seaplanes or both.

ALTIMETER. An instrument for measuring or indicating the elevation of an aircraft above sea level or other fixed point.

ALTITUDE. Height above land or water.

AMPHIBIAN. An airplane designed to rise from and alight on either land or water.

ANGLE, DIHEDRAL OR WING DIHEDRAL. The acute angle between the transverse reference line in the wing surface and the lateral axis of the airplane, projected on a plane perpendicular to the longitudinal axis. The dihedral angle is positive when the upper obtuse angle for the two wings is less than 80 degrees.

ANGLE, ELEVATOR. The angular displacement of the elevator from its natural position.

ANGLE, GLIDING. The angle of flight of an aircraft when gliding down preparatory to landing.

ANGLE, GROUND. The acute angle between the longitudinal and horizontal axis of an airplane when the plane is resting on the ground in its normal position.

ANGLE, LANDING. Same as *ground angle.* See *angle, ground.*

ANGLE, LONGITUDINAL DIHEDRAL. The difference in angle of wing setting and angle of stabilizer setting.

ANGLE OF ATTACK. The acute angle of an airfoil and its direction of motion relative to the air.

ANGLE OF STABILIZER SETTING. The acute angle between the line of thrust of an airplane and the chord of the stabilizer.

ANGLE OF WING SETTING. The acute angle between the plane of wing chord and the line of thrust. It may differ for each wing.

ANGLE OF YAW. An angular deviation of an aircraft along the fore-and-aft axis from its course.

ANTI-AIRCRAFT GUN. Nicknamed "Archie." This type was developed during the World War for use against enemy aircraft. Anti-aircraft guns are fired from the ground and must not be confused with machine guns mounted on aircraft.

ANTIDRAG WIRE. A wire, usually enclosed in the wing, designed to resist forces acting parallel to the chord of that wing and in the same direction as that of flight.

ANTILIFT WIRE. Same as *landing wire.*

INDEPENDENCE MODELS!

Our Other Famous Construction Sets

Stinson-Detroiter	$1.50
Sea "Hawk"	1.00
Lockheed-Vega (new design)	4.00
Cloud-Breaker R.O.G.	1.00
Combination R.O.G. Kit	0.75
Record Twin-Pusher	2.50
Indoor Commercial	1.00
Outdoor Commercial	2.00
Curtiss "Falcon"	3.00
Lockheed-Sirius	3.00
Outdoor Tractor	2.00
The "Eaglet" (model glider)	2.00
Model Amphibian	1.00

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Jap. tissue, per 5 sheets	.25
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Rice paper, per sheet	.04
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1/16" x 2" x 3' Balsa	.12
1/32" x 2" x 3' "	.12
1/8" sq. x 3' "	.03
1/8" x 1/4" x 3'	.04
1/8" x 1/2" x 3'	.07
3/16" sq. x 3'	.05
3/8" sq. x 3'	.07
3/8" x 1/2" x 3'	.09
1/2" sq. x 3'	.09

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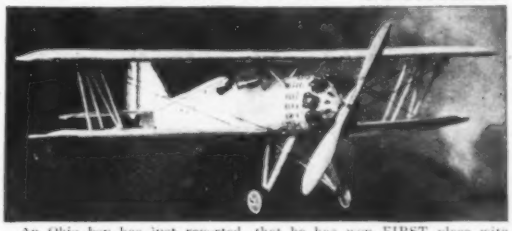
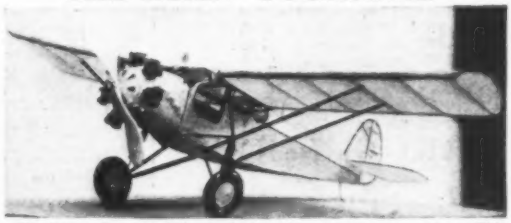
THE VOUGHT NAVY "CORSAIR"



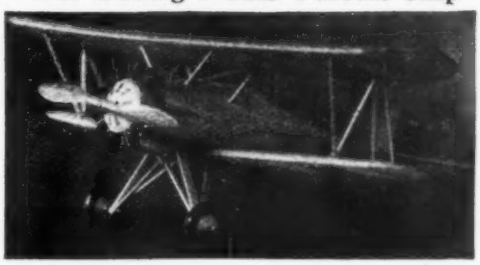
An Ohio boy has just reported, that he has won FIRST place with our model of the Corsair in a recent contest! Doesn't this prove our superior design and realistic appearance of our models? Compare our models with others, see for yourself why our models are better ships. Kit contains all the parts for you to assemble, with our famous aluminum propeller and WASP motor. CONSTRUCTION SET.....$4.00

THE RYAN "FOURSOME"



The Ryan "Foursome" is the latest cabin plane on the market. This model is an authentic reproduction of the original ship, with workable door, detachable wings, and nose piece. It will make a unique construction job! This model has flown over 500 feet. Kit contains all the necessary parts, including a miniature Wright motor, ready-stamped ribs, etc. CONSTRUCTION SET.....$4.00

The Boeing P-12B Pursuit Ship



This 2-ft. flying scale-model of the Boeing P-12B, the latest U. S. Army's pursuit ship, one of the fastest and most rakish machines in America, will make the snappiest jobs! The ship is known for its speed, its rapid climb, its maneuverability and was also used by Capt. Ira Eaker in the Army's Panama-U. S. dawn-to-dusk flight. This model has many minute details as the original ship, such as the X type landing gear, fairings behind the motors, army insignia, single cockpit with windshield, etc. In spite of all these details, yet flights of 500 feet have been obtained, and durations of 45 seconds are possible. WE ARE THE ORIGINATORS OF THIS MODEL, and we suggest that you insist on the original kit, and beware of other imitations. Our kit contains ribs, wheels, dope, glue, jap. tissue, all the parts, including ready-stamped insignia plus our Wasp motor and aluminum propeller, and wood cut to size. GET THE ORIGINAL! CONSTRUCTION SET.....$4.00

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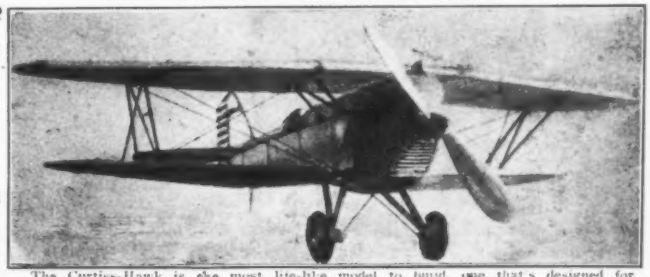
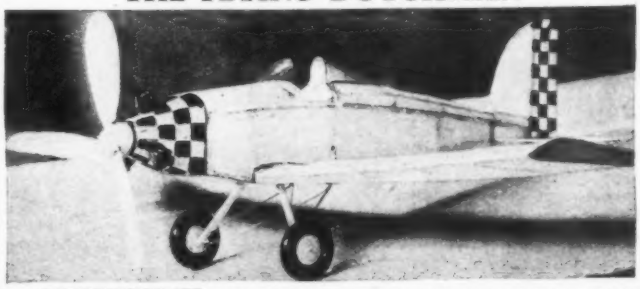
THE CURTISS ARMY "HAWK"



The Curtiss-Hawk is the most life-like model to build, one that's designed for appearance and flying abilities. Kit contains all parts, wood cut to size, wire parts made, spinner, insignia, wheels, motor, etc. CONSTRUCTION SET.....$2.95

THE FLYING DUTCHMAN



This model of the Flying Dutchman is indeed the best sport plane to build due to its simple design and construction. This model will have an average duration of about 45 seconds. This is yet the most beautiful model we ever produced. Kit contains all the materials, stamped ribs, wood cut to size, spinner, tissue, glue, dope, rubber motor, wheels, etc. CONSTRUCTION SET.....$2.75

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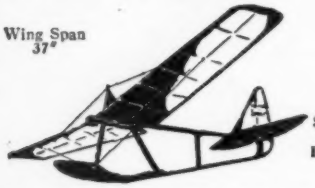

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A 37" scale model of the training, or primary, type glider. Frame is of strong, light balsa. Weighted with shot placed in a cavity in the nose. This gives just the right balance for all kinds of gliding—and you can vary the weighting to suit your own particular glider or flying conditions. Double-surface wings and tail assembly. Complete construction set includes all materials, and detailed plans and directions.

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Wing Span
42"

A 42" glider, patterned after the famous *Eagle* that carried Capt. Hawks on his record-making tour across the continent. Has enclosed fuselage of thin balsa, and solid balsa nose. Adjustable weighting as in primary model. Single landing wheel set into bottom of fuselage. This model is capable of exceptionally long glides when merely launched from the hand. Construction set includes all materials, and detailed plans and directions.

Carved Balsa Propeller is supplied with the new Selley kit for the **GULL** 30" endurance tractor, described in this issue of **Model Airplane News**

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APRON. A hard surface area immediately in front of the entrance of a hangar or aircraft shelter which is used for the handling of aircraft or for repair in clear weather.

AREA, WING. See *wing area.*

ARTILLERY PLANE. An airplane which works with and for the artillery. Its chief duties are aerial observation, range finding, photography, etc.

ASPECT RATIO. The ratio of span to mean chord of an airfoil; *i.e.*, the ratio of the square of the maximum span to the total area of an airfoil.

ATTITUDE. The position of an aircraft as determined by the inclination of its axis to some frame of reference. If not otherwise specified, this frame of reference is fixed to the earth.

AUTOGYRO. A form of helicopter recently invented which has made several promising demonstrations.

AVIATIK. An airplane of German manufacture, having twin propellers.

AVIATION. The art of operating heavier-than-air craft.

AVIATOR. One who operates an airplane and makes a study of the art of flight.

AVIATRIX. A woman who operates an airplane and makes a study of the art of flight.

AXIS. See *lateral axis, longitudinal axis, vertical axis, wing axis, fore-and-aft axis.*

BACK WASH. The blast of air driven to the rear of an aircraft by the revolving propeller.

BALLAST. Any substance, usually sand or water, carried in a balloon or airship and intended to be thrown out, if necessary, for the purpose of reducing the load carried and thus altering the aerostatic relations.

BALLOON. An aerostat without a propelling system.

BARRAGE. A small captive balloon, used to support wires or nets which are intended as a protection against attacks by aircraft.

CAPTIVE. A balloon restrained from free flight by means of a cable attaching it to earth.

CONSTANT PRESSURE.* A Supply balloon arranged to maintain a constant pressure of gas in a moored or docked aerostat.

FREE. A balloon, usually spherical, whose ascent and descent may be controlled by use of ballast or with a loss of the contained gas, and whose direction of flight is determined by the wind.

KITE. An elongated form of captive balloon, fitted with lobes to keep it headed into the wind and usually deriving increased lift due to its axis being inclined to the wind.

NURSE.* Sometimes used to refer to a constant-pressure balloon. Also a reservoir balloon for the storage of gas to be introduced into an active one.

*Those forms of balloons marked with an asterisk are not, strictly speaking, aircraft.

OBSERVATION. A captive balloon used to provide an elevated observation post.

PILOT.* A small balloon sent up to show the direction and speed of the wind.

PROPAGANDA. A small free balloon sent up without passengers but with a device by which papers or documents may be dropped at intervals.

SAUSAGE. A kite balloon having the shape of a sausage.

SOUNDING.* A small balloon sent up without passengers but with recording meteorological instruments.

SUPPLY.* A container made of heavy fabric employed as a portable means of storing gas at low pressure. It is usually too heavy to rise, even if free.

TRIANGULATION.* A small captive balloon used as a mark on which to sight in a triangulation survey.

BALLOONET. A small bag, usually of varnished silk inflated with air. Kept inside a spherical or dirigible balloon for the purpose of retaining its shape after loss of gas, as by condensation on release.

BANK. To incline an airplane laterally, *i. e.*, to rotate it about its longitudinal axis.

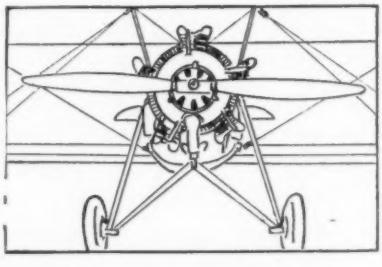
BAROGRAPH. An instrument for recording the barometric or static pressure of the atmosphere.

BARRAGE BALLOON. See *balloon, barrage.*

BARREL ROLL. See *roll.*

BASKET. The structure suspended beneath a balloon for carrying passengers, ballast, etc. It is usually used on a free observation or kite balloon.

BAY. The portion of a face of a truss, or of a fuselage, between adjacent bulkheads or adjacent struts or frame positions.



BIPLANE. An airplane with two main supporting surfaces placed one above the other.

BLIMP. A small non-rigid airship. "Airship" is to be preferred. (The name came from an English type B. limp contracted into Blimp.)

BODY. Same as *fuselage.*

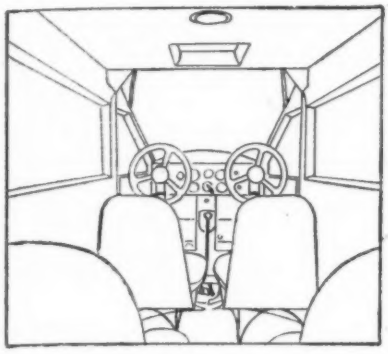
BRACE WIRE. See *wire, brace.*

BRACE-WIRE BRACKET. A light metal stamping used to attach the brace wire to the surfaces which it braces.

BUMP. A natural disturbance of air currents which causes uneven and rough flight. "The airplane hit a bump." "The air was bumpy."

BUS. Slang for any aircraft.

CABANE. A framework for supporting the wings of the fuselage; also applied to the system of trussing used to support overhang in a wing.



CABIN. An enclosed cockpit of any aircraft. The enclosure of an aircraft designed to accommodate passengers and pilot.

CAMBER. The rise in the curve of an air-foil section from its chord, usually expressed as the ratio of the departure of the curve from the chord to the length of the chord. "Upper camber" refers to the upper surface of an air-foil and "lower camber" to the lower surface; "mean camber" is the mean of these two.

CAMERA GUN. A camera which has the shape of a machine-gun. This is mounted on an aircraft and is used when training pupils in aerial fighting. The camera when "shot," takes a picture of the target instead of shooting a bullet at it, thus showing the pupil his marksmanship.

CAPTIVE BALLOON. See *balloon, captive.*

CARPET. Slang for ground.

CEILING. Slang for sky.

ABSOLUTE. The maximum height above sea level at which a given airplane would be able to maintain horizontal flight assuming standard air conditions.

Also used to indicate cloud-free air height.

SERVICE. The height above sea level, assuming standard air conditions, at which a given airplane ceases to be able to rise at a rate higher than a small specified one (100 ft. per min. in the United States and England).

CENTER OF MASS. The point in an aircraft at which the greatest portion of weight lies. The one point on which an aircraft would balance itself longitudinally and laterally when in contact with nothing but that point. That point in an aircraft about which all other parts, which are acted upon by the attraction of gravity, balance each other in every position.

CENTER OF PRESSURE. Usually used in reference to an airfoil. The point at which the surface of an airfoil is intersected by the resultant force of all the pressures acting on its surface.

CHORD. (Of an airfoil section). The line of a straight edge brought into contact with the lower surface of the section at two points; in the case of an airfoil having double convex camber, the straight line joining the leading and trailing edges. (These edges may be defined, for this purpose, as the two points in the section which are farthest apart.)

The line joining the leading and trailing edges should be used also in those cases in which the lower surface is convex except for a short flat portion.

The method used for determining the chord should always be explicitly stated for those sections with regard to which ambiguity seems likely to arise.

CIRCUS, (PEACE). An exhibition of aerial acrobatics in which a number of airplanes take part.

(WAR). A pursuit squadron whose members fought together as a unit and were allowed to operate on any and all fronts.

CLIMB INDICATOR. An instrument which indicates the amount of a dive or a climb of an aircraft.

CLOCK. An instrument which indicates the passage of time; similar to an automobile clock.

COCKPIT. The open spaces in which the pilot and passengers are accommodated. When the cockpit is completely housed in, it is called a cabin.

(To be Continued)

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3 sheets	1/16″x6″x24″	.90
10 sheets	1/16″x1″x20″	.40
20 sheets	1/16″x2″x12″	.50
25 sticks	1/4″x1/4″x36″	1.10
25 sticks	1/8″x1/4″x36″	1.00
12 sticks	1/8″x1/4″x36″	.50
25 sticks	1/8″x1/8″x36″	.60
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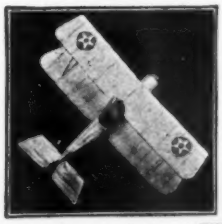

The S. E. 5 Scout

The S. E. 5 Scout plane is one of the best flying scale models that can be built. Made of featherweight Balsa and Bamboo parts. Wing span 22 inches, fuselage 16 inches. Rises from ground by own power. Recorded flight 45 seconds. It really is a reproduction of the old Army pursuit plane; you'll get a real thrill when this ship goes "Zooming" away. Get this S. E. 5 Scout plane kit set with all material and detailed blueprint ready to build. Send now. Postpaid, $3.00. No stamps.

Navy Racer X 600

The Navy Racer is scaled along the lines of the model which recently broke all speed records in England. This is the plane you'll really want to build. What a thrill when you have your Navy Racer assembled—how proud you'll be at your own skill. Made of featherweight Balsa and Bamboo parts. Wing span 22 inches, fuselage 17 inches, altitude over 60 feet, recorded flight over one minute. Get the Navy Racer plane kit set with all material and detailed blueprint ready to build. Send now. Postpaid, $3.00. No stamps.

The Hawk

The Hawk is the plane for those who have already built model planes and want to build a better one. What a thrill when you have your Hawk assembled—how proud you'll be at your own skill. Made of featherweight Balsa and Bamboo parts. Wing span 24 inches, fuselage 14 inches. Get the Hawk plane kit set with all material and detailed blueprint ready to build. Send now. Postpaid, $3.00. No stamps.

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FULL SIZE and SCALE

24″ Wingspan

Curtiss Hawk P. 6.	$0.40
Curtiss Hawk (Radial P.3.A.)	.40
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Special Course in Air Navigation

(*Continued from page* 20)

Practically every map or chart used in the air gives the variation for the areas it covers, and also the annual rate of change of variation in these areas. The Chamber of Commerce Strip Maps, or the Rand McNally State maps are the best for aviation purposes in this country. All maps are drawn to scale, certain distances on the map, representing certain definite distances on the ground. The scale of a map may be shown in various ways such as

One inch to 10 miles.
RF. 1/253,440.
A drawn scale.

The first and third are self explanatory, while the second shows that one inch on the map equals 253,440 inches on the ground, or 4 miles. This is called showing the scale by representative fraction, and is written RF as shown.

The scale of a map will obviously determine the amount of detail to be shown on it, but providing aviation maps are used, the features necessary to a pilot will generally be included. The size of the map to be used will depend largely on the nature of the country to be flown over, and the distance to be covered—too much detail is often as misleading as too little. A 1/4-inch to the mile map is generally considered most satisfactory. The conventional signs on maps should be studied, *i.e.* the signs denoting landing grounds, railways, hills, roads, towns rivers, lakes, etc. It is not proposed to go into them here, as they are usually printed on map margins, and an intelligent study of the map will soon make them clear, but it cannot be emphasized too much, how essential it is for a successful air navigator to be able to read his maps quickly and accurately.

Excluding maps on Mercator's projection, the main properties of aviation maps may be summarized as follows:

1. Great Circles on the earth's surface are represented approximately by straight lines on the map.
2. The scale of distance is constant and may be used anywhere.
3. Courses are taken from the angle made with the nearest meridian (which is not always parallel with the edge of the sheet).

The main differences in a map or chart based on Mercator's Projection are that:

1. All meridians of longitude are parallel and do not converge towards the poles.
2. All parallels of latitude are at right angles to the meridians.
3. All straight lines on a Mercator's Projection are Rhumb lines.

Owing to the distortion incurred in preparing a chart of this type, the degrees of latitude become more unequal near the poles, and tables have to be used in calculating distances. (See Figure IV.)

It will be seen from this sketch which illustrates the difference, on a Mercator's Chart, of the actual differences on the chart between different parallels of latitude. It will be seen that the further N. you go from the Equator, the greater the distortion becomes. The actual distance on the ground between parallels of latitude A-B on the sketch, is the same as between parallels C-D though this would not appear to be the case from the chart.

It has already been stated that the line of a great circle is the shortest between two points, but the distance saved by steering such a course on short flights is negligible, and not worth the continual changing of the compass course it involves. So that for all purposes of normal flying, the bearing of a straight line drawn on a map or chart is the best track to follow.

A comparison of Great Circle and Rhumb Line distances is given:

	G. Circle Dist.	R. Circle Dist.
Ldn (Eng.) to N. Y.	3006 miles	3006 miles
Ldn (Eng.) to Tokio	5259 miles	6222 miles

If, however, it was proposed to fly from New York to a point 500 miles due East, the course would have to be changed slightly about every 35 miles to follow a Great Circle bearing, and the saving in distance would be about two miles only.

QUESTIONNAIRE

1. What is the Prime Meridian?
2. Explain the difference between Deviation and Variation.
3. How is latitude measured?
4. How many nautical miles are there in one degree of latitude?
5. Under what circumstances would it be better to follow a Great Circle bearing than a Rhumb Line bearing, and why? What are the disadvantages?

No matter what else you do, do not fail to continue your study of this Course in Aerial Navigation. Capt. Leslie Potter's thirteen years of experience in this subject stamp him as one of the outstanding authorities.

Watch for your MODEL AIRPLANE NEWS. On all news stands July 23 next, and only 15 cents a copy!

How to Build a Gull Endurance Tractor

(*Continued from page* 21)

bend over a flame to shape for the wing tips. Taper one end and cement in place against the inner entering edge which protrudes. Cut off the other end squarely and cement the bracing rib. Glue a piece of fish line or twisted cord along the feather edge of the auxiliary wing.

After the entire wing is thoroughly dry, cut off the edge of the wing tip at the entering edge to a good, clean taper. Now lay one wing flat on the table and fit the other against it, with the tip of the second wing resting on a 7 1/2" block. Cement in place and allow to dry.

Make a reinforcement piece of 1/16" x 5/16" balsa 2" long and cement in place. Trim. After it is thoroughly dry, form the wing clips of .025 music wire for the front and rear of the wing and glue these to the entering and trailing edges.

A PIECE of balsa 1/16" x 5/8" 2 1/4" long is used for the main spar in the stabilizer. Carve out the sides as shown in drawing and file out the 3/16" groove 3/8". File out the corners. Place two pieces 1/16" square balsa 4" long at the end with the groove. Then place two pieces 1/16" square balsa 4 1/8" long at the other end of the main spar of the stabilizer. Trim the ends to make a snug fit and cement in place. Brace the stabilizer with additional pieces of 1/16" square balsa, as shown in drawing.

Cut out of 1/16" balsa two tail ribs as shown in the detail drawing. Cement in place and allow to dry. Form the 1/16" reed over a flame for the tail tips and then glue in position. Next glue the fish line in place and allow to dry.

Take a piece of 1/16" reed about 10" long and form over a flame in rudder outline, as shown in the drawing. Cement the 1/16" square balsa brace in position, and also the fish line trailing edge. Bind the upright rudder post in place, cement and allow to dry.

Cover the wings, rudder and stabilizer on top only. Use white shell glue on the entering and trailing edges and stretch the paper across the top. Pull out all wrinkles and trim edges.

Carve propeller out of block 12" x 1 5/16" x 1 1/8", as shown in drawing. Now form the propeller hook of .025 music wire and insert, after drilling a hole through the propeller. Bend it back, forming a square hook, and press into propeller.

An outdoor endurance tractor of entirely new design is now complete. Although it has a 12" propeller and 30" wing-spread, it weighs but 3/4 ounces complete. Consistent flights of 100 seconds and more can be made with this model if it is properly built.

The Gull uses a very slow propeller for great duration of flight. Despite the torque of the large propeller, the model flies on an even keel and keeps on a straight course. This is accomplished by the sweepback and pronounced dihedral of the wings, and by the upturned wing tips, which also help to maintain altitude.

The sweepback of the wing makes only a small rudder necessary and its tapering design brings the greatest lift nearest the fuselage and makes a very sturdy construction.

MODEL AIRPLANE NEWS PLANS AND PARTS

THOSE who wish to purchase parts for the construction of models, or blueprints, will be furnished with the name and address of the company which stocks them, upon request for this information from the reader. Address the Editor, MODEL AIRPLANE NEWS, Macfadden Publications, Inc., 1926 Broadway, New York City.

MODELS OF DISTINCTIVE DESIGN
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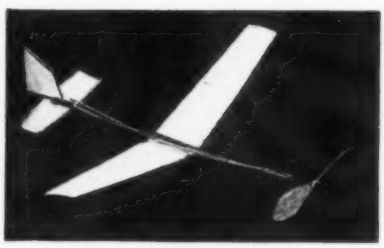

National Midget

Just what the name implies. A small-stick plane, 11" stick, 12" wing spread, 5" propeller, feather weight; finished in color. Complete kit with drawing and directions. **Price $0.50. Postage 10c extra.**

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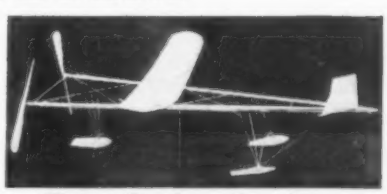

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Large 32-page Catalog describing many more Construction Sets and Supplies, 5c postpaid.
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Simplex Air Model Co.

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1/16" x 1/8"	x 3'	spruce .05	balsa .03
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A 5 cent service charge is required on all orders amounting to less than $1. A 5 cent packing charge is required on all shipments of wood greater than 18" in length. Prices subject to change without notice. Goods sent postpaid in the U. S. A. only.

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Send 5c for bundle of Balsa and Price List on Supplies.

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SPECIAL COMBINATION—1 skein rubber—1/8" or 3/32" flat (specify which) & 2 oz. lubricant till July 1st only $1.00 postpaid.
BEST RUBBER LUBRICANT KNOWN used on all latest record models. Doubles winds—Big 2 oz. can, only 35c postpaid.
SEND 10c AT ONCE FOR A NEW ILLUSTRATED LIST JUST OFF THE PRESS showing all the latest and best materials as used by recent National contest winners of trips to Europe, etc., with surprising low prices on the best materials.
Schools: clubs, dealers write for terms. "Model Airplane Experts of Today are the Aviation Experts of Tomorrow."

PERU MODEL AIRPLANE SHOP

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Macfadden Aviation Advisory Board

(*Continued from page 44*)

Lieut. Jailler	12
Lieut. Garand	12
Lieut. Marcel Hughes	12
Lieut. Sardier	11
Lieut. Tarascon	11
Lieut. Ortoli	11
Serg. Marinovitch	11
Adj. Ehrlich	10
Lieut. Nogues	10
Lieut. Bourgade	10
Lieut. de Sevin	10
Adj. Herbelin	10
Lieut. de Turrene	10

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Lieut. Rene Dorme	23
Lieut. Jean Chaput	16
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Lieut. Nevarre	12
Lieut. de la Tour	11
Adj. Maxime Lenoire	11
Serg. Quette	10

British—(living)

Major Raymond Collishaw	77
Col. William A. Bishop	72
Major E. Mannock	71

(*To be continued*)

Now to a few questions and answers:

Gentlemen:

What has the thickness of the wing to do with its lifting power?

Why is it that seaplanes hold the speed records? I should think that wheels are lighter than pontoons. Is a seaplane easier to land than an airplane?

Is a plane equipped with skis harder to land than an airplane?

Does the speed of a plane depend on the r.p.m. or the h.p.?

If the Do-X has power proportionate to its weight, can it stunt? If not, why not?

What is your opinion of the future of the autogiro? Will it supplant the airplane to any degree?

Why did the "Yellow Bird" start with three men while two would have been enough and the rest of the space could have been used for gas?

Yours truly,
MICKY SACKS,
125 Eastern Parkway,
Brooklyn, N. Y.

Answer:

Regarding the relation of the thickness of the wing to the lifting power of a plane, the greater the camber, the greater the vacuum over the top of the wing; hence greater lift, as vacuum is valued at approximately two-thirds of the lifting power of a plane.

Speed records are held by seaplanes for the reason that it is easier to land on water while traveling at a great rate of speed than it would be to land on the ground. In creating very speedy landings on the ground, the tremendous force would shake up the plane greatly, while on the water it can glide along for some distance before stoppng. If this were not the case, landplanes would be better for creating speed records as wheels are lighter in weight than pontoons.

It is not any more difficult to land a plane equipped with skis than one without them.

The speed of an arplane does not depend on either the r.p.m. or the h.p. but is due mostly to the design of the ship.

The Do-X can stunt but it is not worth the risk of causing structural strain to do this.

The future of the autogiro is a moot question and cannot be definitely decided, pro or con. So far, it has not supplanted the airplane in the matter of passenger carryng, etc., but if it can be practically proved that the autogiro can be successfully equipped with motors in the vanes, then, of course, it can be seriously considered as a rival of the airplane.

The "Yellow Bird" carried three men because the third, Lotti, was the financial backer and insisted on being taken along as a passenger.

Dear Sirs:

I would like to know whether the Challenger engine is air-

When You Return From Your Vacation— What Will You Find?

It may sound odd, but no matter where you are going to spend your vacation, your home must play an important part in your vacation plans.

You are fortunate to be going away for the season, or grateful for even a short respite from the business of housekeeping. But don't forget that you will have to come back. And what a slump from a gay holiday to a cheerless home for a vacation-wearied body! And if you can't get away at all for a vacation it is even more important that your home should be the most attractive place on earth.

The July issue of YOUR HOME Magazine is the place to find advice and encouragement in matters of joyous home-making—is full of ideas that will make any home and garden a vacation spot and a haven after the gayest of seasons. It will bring you intriguing new developments on bright colors in the breakfast nook, new roles for scatter rugs, desk accessories with personality, new colors and uses for oilcloth, distinctive hardware, peasant pottery to brighten dark corners, climbing roses, summer-long delphiniums, Tom Thumb plants to edge the garden beds, the growing of iris, midsummer pruning, July garden activities, and in addition, all-the-year-round suggestions on remedies for leaking roofs, keeping down repair bills, fireplaces that refuse to draw, and a home builder's dictionary.

Just as each issue of this practical and inspiring magazine has done in the past, the July issue gives you both timely and enduring ideas, which you will find yourself putting into practice and see your home becoming a spot which vacations will take you from reluctantly and to whose welcome cheer you will eagerly return. YOUR HOME—the home maker's friendly adviser. 25c a copy. All news stands June 23rd.

cooled. Will you please tell me how the air-speed indicator works?

Yours truly,
REED LAKER,
Riverdale Power Plant.
Ogden, Utah

Answer:

The Challenger engine is an air-cooled type.

The air-speed indicator is governed by the principle of pressure of wind through the Pitot tube, which works on the spring (coil) and forces the arrow-pointer against the scale marked off in miles per hour.

Gentlemen:

Where could I obtain a real air map and about how much would it cost?

Please tell me also what effect liquor would have on an aviator if he drank moderately or had the habit of drinking.

Yours truly,
WALTER DRUMM,
418 Chapel St.,
Lebanon, Pa.

Answer:

You will be able to secure an air map by applying to the Department of Commerce, Aeronautics Branch, Washington, D. C. We do not believe there is a charge for this.

With reference to the effect liquor has on a flyer, this is strictly a matter of individuality. After all is said and done, liquor numbs the coordination between the mind and the muscles. Consequently, anybody in a befuddled state will have less coordinate control than a definitely temperate or positively "dry" person. The further away from liquor one keeps while holding such responsibility as piloting a plane in which the lives of passengers are in one's hands, the less chance there is of mishap and the longer one lives.

Gentlemen:

I would like to know which is the fastest airplane.

At what age could a man learn to fly a glider?

Yours truly,
MILTON CYKOWSKI,
3153 Warsaw St.,
Toledo, Ohio.

Answer:

The U. S. passenger plane record is help by the Travel Air "Mystery" Ship, which did approximately 200 miles an hour. The fastest plane in the world is the Supermarine S-6, which did 357.7 miles an hour over a special course after the Schneider Cup Races. This is a seaplane.

It is wise to wait until one is sixteen years or more before attempting to fly a glider.

Dear Sirs:

Is there a seadrome being built in the ocean as yet? Where?

How much did it cost to learn to fly in 1912?

Could you tell me where to get some pictures of airplanes which were built from 1910 to 1915?

Is there a possibility of an air-

ANNOUNCING

BROADFIELD "AIRTITE" TISSUE

A New Wing Covering for Contest Models

Broadfield "Airtite" Tissue is a brand new wing covering. It is the smoothest covering you ever saw—lighter than Japan Tissue, and absolutely airtite! Makes a perfect covering without dope or may be doped for outdoor models. "Airtite" Tissue is made in U. S. A. especially for model use.

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Take a piece of Japan Tissue, and hold it up to your mouth and blow thru it.

Then try the same with a piece of "Airtite" Tissue, and you will find it impossible to blow thru it.

The quality of being absolutely "Airtite" adds greatly to the efficiency and performance of all fine models. Cover your next contest model with this remarkable new tissue, and notice the improved performance.

Send 50c in stamps or money order, for the limited offer listed below—please

2 sheets "Airtite" Tissue 24 x 36"	25c
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1 pkg. 10 pcs., Balsa 1/20" x 1½" 6" to 12" lengths	25c
1 Broadfield 44 page Catalog	10c
Value	75c

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Dept. A, Hempstead, L. I., N. Y.

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in your neighborhood? Then fly the LOOK-OUT commercial model. An easily constructed cabin ship. It will put you ahead of all your friends. Send money order for complete kit.
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Models built from this kit have flown over two minutes indoors. This kit contains complete plans, highest grade balsa wood, Jap tissue, rustproof wire, pure Para rubber, glue, and banana oil. Send your 45c today and get these two planes for the price of one. (No stamps). We pay postage. DEALERS: Write for special discounts on this popular kit.

AMES-HARRELL MODEL AERONAUTICAL CO.
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Model Airplane Supplies

and Two Plane Construction Kit containing complete equipment for building one Powered Sail Plane and one Model Training Plane.

EVERY piece of material is carefully inspected before shipping and is guaranteed against defects. A catalogue, which will be sent you upon receipt of 5c in stamps to cover postage, contains only the very best airplane building materials possible to obtain and at very moderate prices, too.

The Two Plane Construction Kit is made up with plenty of material for building a Powered Sail Plane with a 22-inch wing span and a Model Training Plane with a 14-inch wing span. Either of these planes will be envied by any Model airplane enthusiast.

An easily read and complete set of building instructions are included in each kit. These kits are especially prepared for building planes that will win contests.

Just fill in the coupon below and send it along with your post office money order for one dollar and the kit will come to you by return mail.

THE CANTON MINIATURE AIRCRAFT CORPORATION,
1600 Fourth St., S. E., Canton, Ohio.

Gentlemen.—
Please send me by return mail those items on which a check mark appears in the square below for which I enclose the necessary stamps or money order.

☐ Kit containing equipment for building 2 Model Training Plane and a Powered Sail Plane.....$1.00
☐ Catalogue of high grade supplies for building Model Planes of any type.....05

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about the new Lata Balsa Wood for particular Model Builders. Each piece of Lata Balsa Wood, no matter what size, is specially selected and graded before it is cut. Every piece is guaranteed light, strong, clear, straight grain. Here is a new and reliable source for purchasing your Balsa Wood. Send your next order to Broadfield, one of the pioneer Model Aeroplane Manufacturers of the country, and get the finest grade Balsa you ever used.

SPECIAL LIMITED OFFER

For a limited time, we are offering two assortments of Lata Balsa Wood as listed below. For quick action in answering this advertisement, you will receive a special worth-while premium, that every model builder will appreciate, free with either assortment.

Check the assortment you desire, and we guarantee immediate delivery.

(Send money order or stamps, please)

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BS1	1/16 x 5/32	per pkg. of 6.....25c
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Balsa Sticks 24" long

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10c 3 for 25c BIG FUN

BOYS You apparently see thru Clothes, Wood, Stone, any object. See Bones in Flesh. FREE Pkg. radio picture films, takes pictures without camera. *"You'll like 'em."* 1 pkg. with each 25c order.
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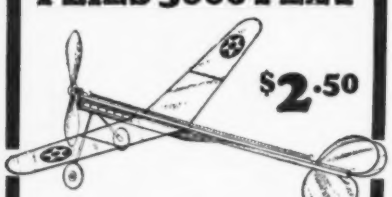

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Knocked Down—easy to assemble without tools—everything cut, drilled, and bent to shape—all materials furnished.....$2.50 Postpaid.

Ready to Fly—Beautifully decorated in Vermillion and Oriole Yellow on transparent wings.
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Order Now While The Flying Weather Lasts.

KAHN AIRCRAFT COMPANY
5710 Woodlawn Ave., Chicago, Illinois

plane going around the world without a stop and refueling in the air?

Yours truly,
CHARLES NAGLE,
100 Holland St.,
Wilkes-Barre, Pa.

Answer:

The Armstrong seadrome, designed by a noted American engineer, has not progressed much from the model stage. It is understood that a company is being formed to finance the construction of a real seadrome from the model.

We have no record of what it cost to learn to fly in 1912. It was pretty costly, however, as flying in those days was only in its infancy and boys like yourself had none of the facilities of today. In fact, you might say that in 1912 it was only the rich man with a yearning to fly who took up the sport—as it was then—to any degree.

It is extremely difficult to obtain pictures of planes between 1910 and 1915.

Arrangements already are being made for an around-the-world nonstop refueling flight. The flight will be an American undertaking.

How to Build a Flying Tanager Ski Plane

(*Continued from page* 33)

lage frame sticks apart. Fix detail P fuselage bottom cross braces 1/16" x 1/16" x 1-3/8" balsa wood in place. Be sure that the bottom of fuselage is squared with top of motor sticks, otherwise landing gear and wing will be out of line, causing model to fly low winged, *i.e.*, one side higher than the other.

WINGS

Now make the wing frame. This is composed of fifteen parts—two leading edge spars, two trailing edges, seven ribs, two pieces of balsa wood 1/32" x 1/16" x 2-13/16" and two wing ends.

Build the wing in halves, right and left. Take front spars, detail D—balsa wood, size 1/16" x 1/8" x 10-1/2". Mark position of ribs as shown on both spars, repeat marking operation on rear spars, detail E—size 1/20" x 1/16" x 10-1/2". Place ribs in position as shown, pin in place, cement and allow to dry.

Wing end rib and wing tip end—details O and G. You will note that detail O is a piece of balsa wood 1/32" x 1/16" x 2-13/16". This piece of balsa wood is a straight piece of wood. Cement to ends of spar before placing wing tip end, detail G in place. Detail G is put on top of this flat rib detail O at an angle of approximately forty-five degrees. Please note how detail G wing end is made.

It is a piece of balsa wood 2-13/16" x 7/8", center of which is cut out, leaving a frame 3/16" all around. Cut corners off as shown and strengthen one side with cement. These wing ends are easily made from drawing. Be sure and place these wing ends at a forty-five degree angle as they incorporate and give to this model great stability. Be sure and make right and left halves.

When halves are completed, butt together; place center rib in position and cement it, putting approximately one and a half degrees dihedral in wing. Allow to dry thoroughly. When dry, cover, keeping the paper smooth and placing paper over the wing ends.

We have shown on the instruction sheet in large detail views of method of placing wing clips on spars and of strengthening them. Wing clips are made from Number 8 music wire. Note drawing of exact size of each wing clip. Also notice method of strengthening. Place wing clip on rear spar where this is cemented with a small piece of bamboo. This is easily done and should not offer any difficulties to the average model builder.

STABILIZER

The reverse curve, 3/16" deep, is used in this model. Take a piece of balsa wood 1/32" x 1/2" wide and 2-3/8" long, from which to make the stabilizer ribs. They are sliced off 1/32" x 1/32" x 2-3/8". Mark off position of ribs on spars detail I. (Size of spars, 1/16" x 1/16" x 7"). Cement and allow to dry. Be sure and cover bottom of this stabilizer.

Next is rudder—K. It is made from one piece of bamboo approximately 1/32" x 1/32", using a balsa wood reinforcement stick, detail W, known as rudder cross-brace, which is a piece of balsa wood 1/32" x 1/16" x 3". Draw the outline of this rudder from the drawing. Be sure and make this as light as possible. Leave enough of bamboo on bottom so that it can be inserted in place, the same as a pin would be inserted. Cover with paper.

At this point it is about time to cover sides of fuselage with paper.

LANDING GEAR

The landing gear is easily constructed and is made of bamboo (detail L), pieces 1/32" x 1/32" x 7-1/2" long. Place on fuselage 4-1/2" from front of motor stick. Cement on motor stick and fuselage frame sticks. Slit these landing gear struts and insert cross braces as shown. Cement and allow to dry. Next make the skis (detail M). They can be made of bamboo or balsa and are 1/32" x 1/4" x 7". When landing gear struts are cemented and can be handled, place skis in position as shown.

Cement heavily and allow to dry. Be sure that each ski is level. Wheels also can be used and are

FREE!!!

Sets of wings given free to every purchaser who builds a model of the Fokker D7 or any other model from our Large Full Size Blueprints. The Fokker D7 was used by Baron von Richthoffen, "The Red Ace of Germany" during the World War. Richthoffen was considered the Ace of Aces, having brought down more planes than any other aviator during the World War.

Construction set with Full-Size Plans.....$5.00

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With each order of a construction set of blueprints you will receive an entry blank which entitles you to enter this contest in which Large Valuable Prizes will be given to the many winners. Only pictures of finished models are required and are to be sent to us. Choose from any of the following:

Large Full Size Blueprints

Mercury	40c	Fokker D7	75c
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Curtiss Tanager Safety Plane			75c
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4 large sheets to a set.
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1/16" x 6"	x 36"	.40 ea.
1/8" x 6"	x 36"	.45 ea.
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Jap. Hacone Tissue 20-1/2" x 24-1/2".....05 ea.
Guaranteed Colorless or colored *Ambroid* Cement.
.....28 2 oz.
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045 or 1/8" Pure Para Rubber, 210' skeins.. .95

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Not just a lucky flight—but every boy who has built the NEMAA twin pusher has made successful flights—many from 6 to 10 minutes. Won 6 prizes at Detroit last year including 2nd and 3rd places.

BIG CONSTRUCTION KIT

NEMAA twin pusher plans	.05
2 Balsa spars, 3/16 x 3/8 x 40	.10
2 Balsa spars 1/8 x 3/8 x 40	.10
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2 Balsa veneer 1/16 x 1-1/4 x 15	.06
3 strips Bamboo 14", 12", 8"	.06
2 Special Japanese tissue	.06
2 Coils music wire .018, .026	.10
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1 tube ambroid	.10
1 tube banana oil	.08
2 bearings .040 hole	.02
44 ft. best para rubber	.44
ALL for One Dollar Postpaid	$1.59

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put in position as shown, using a small piece of Number 8 music wire cemented on the ski, using one inch diameter balsa wood wheels. Be sure to cement washer on each side of wheel. This model also can be equipped with a pontoon so that it will take off the water. The pontoon is a V shaped affair, bottom of which is covered with paper and doped. The dotted line on the side view of the drawing shows the exact shape. Use skis as outriggers so that model will not tip over on its side when taking off or alighting on water.

PROPELLER

The thinner the propeller, the less weight there will be and the more efficient the propeller will be. If propeller has too much pitch, moisten with water and twist. Pin this down until dry. The designer usually dopes his propeller when pinned down and it retains its shape permanently.

Notice side view of propeller. Cut away wood as shown from the center and tips. This design of propeller is very efficient. Be sure that the side of propeller on which washer is cemented is square; otherwise propeller will have an eccentric motion which will be detrimental to the performance of the model in flight.

ASSEMBLY

Assemble stabilizer, using extension spar (detail H) which is a piece of balsa wood 1/16"x1/8"x5-3/8" on rear of motor stick as shown. Front of stabilizer is 2-1/8" from rear of motor stick and has an overlap of approximately one inch. Stabilizer is cemented on end of fuselage extension (detail H) as shown in drawing. Be sure that the stabilizer is square. Rudder is inserted at point where extension H is cemented on front stabilizer spar (detail I).

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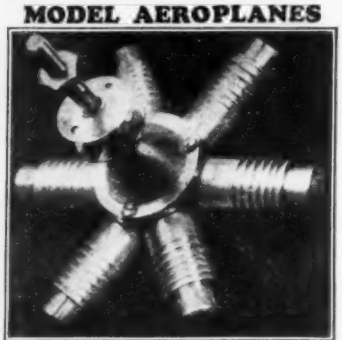

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Stick pin through this point, insert prong of rudder and cement in place. It is recommended that builder place fuselage in front of him and turn rudder to the left approximately 1/4".

TO FLY THE MODEL

Place wing on model approximately one and a half inches from point of intersection of landing gear struts on motor stick. See that wing clips hold firmly on motor stick. Model should glide evenly. If it dives, shift wing forward. A good, long, even glide should be obtained from this model without propeller. If rudder has been turned as told previously, model will turn.

Tie a square knot at the end of the rubber. Cut away sufficient paper from the bottom ends of fuselage so that rubber can be inserted by dropping through. Place propeller, using an extra washer on propeller hanger. Hook up each end of rubber as shown in drawing.

Adjust model by shifting main wing along fuselage motor stick forward and backward until the best position for flying is found.

Wings of Valor

(*Continued from page* 31)

Jimmy switched on the ignition and revved the engine. His father by this time had almost gained the rear cockpit.

Suddenly there rang in Jimmy's startled ears the staccato report of a single revolver shot. He turned swiftly in his seat to see his father reel and stagger, then sink to his knees. A thin streak of blood ran crazily down his leather tunic.

SOME hundred yards behind them he saw Joe racing madly down the trail, a smoking .45 in his hand. Another crashing detonation echoed through the mountainside, and a steel slug whirred through the air and ate its way viciously into the undercarriage. Jimmy was halfway out of the cockpit to go to his father's aid, when the latter pulled himself up with an effort.

"Go ahead, Jimmy," he gasped. "Never mind me. Save that mail plane and then bring help."

For an eternal moment Jimmy remained undecided, one leg thrown over the cockpit's side. In the rear came Joe charging swiftly down the trail. His father turned imploring eyes upon him.

"Go ahead, Jimmy," he repeated in a thin, cracked voice. "It's the only way. I'm all right."

Still Jimmy hesitated. His father met his eye, and gazed at him steadily for a moment.

"Son," he said. "It's an order. I command you to leave me and save that mail plane."

A whining chunk of lead from Joe's .45 savagely bit its way halfway through a strut. Jimmy turned away and fought a sudden tear that welled to his eye. He opened the throttle wide for a moment, then eased her down. Another round from Joe's gun sang a whining threnody over his head.

Slowly the Sikorsky taxied across the even floor of the improvised mountain tarmac. Tense as the situation was, Jimmy did not fail to notice the careful preparations the gang had made. The field was flat and even; and along the sides were huge nickel searchlights ready to throw their great beams into the dark heavens to permit night landings to be safely made.

Gradually the ship gathered speed. Jimmy pulled back the stick, and the plane responded by thrusting her nose into the clouds. Her spinning wheels left the ground gently. A terrific barrage suddenly hurtled through the struts. Jimmy glanced over his shoulder to see Joe emptying his gun after the fleeing ship in a last desperate endeavor to recapture his prisoner. Jimmy breathed a sigh of relief, as the shots abruptly ceased, and he found himself and the ship undamaged. He circled warily for a moment, and cast an anxious glance at the prostrate figure of his father on the ground below.

He saw the man on the ground stir, and his keen eyes interpreted the gesture as a wave of encouragement. He set his mouth in a thin, hard line, jammed down on the rudder, gave her the gun, and was off toward Salt Lake City once again.

Almost at the base of the mountain wall which hemmed in the plateau, he pulled back the stick again, and the monoplane shot upward into a misty red streaked cloud. Far to the North—a finite speck in infinity—he saw his quarry. His face set in a grim tenseness, and with a firm, dexterous hand, he opened wide the throttle and pounded through space like a sweeping nemesis from heaven.

For every twenty miles the biplane traveled, the monoplane made thirty. On and on they swept in a mad chase over a rocky wilderness. The mountain peaks rushed past them like huge teeth in a Gargantuan comb, flung carelessly to earth by some casual god.

The cool, refreshing north wind flung itself in the face of Jimmy Webster. A bitter alien emotion burned deep down in his heart. His whole being was permeated with an overwhelming desire for revenge upon those who had mistreated his father, and interfered with the United States Mail. His eyes ached with the intensity of his fixed gaze through space at the other ship which loomed larger and larger at each turn of the prop.

Of a sudden he was aware of another speck in the distance beyond

the ship that he was pursuing. He glanced up at the flaming sun, and estimating the time, he knew that the oncoming bird was the mail plane. He coaxed a few more revolutions from his already taxed propeller in a desperate attempt to overtake the bandits' ship before they had decoyed the mail plane into making a landing.

He judged that he was not more than six or seven hundred yards from his quarry. His hand held firmly on the stick, and his eyes became agate balls of determination and resolve. Far over to his left he could vaguely make out the squat hangars of the Morgan Flying Field. He felt a new calm as he realized that his friends were close, although ignorant of the peril that threatened him.

The three planes converged like the lines of a triangle to a certain point. Jimmy estimated that at the rate he was making he would pass the mail ship within less than a minute after the bandits' plane.

LIKE an eagle he swooped down upon the enemy. Closer and closer he drew. The mail ship loomed large before him. In a moment it would pass the ship that would give a false distress signal. Jimmy's watching eyes saw a gloved hand appear from the bandits' plane and gesture toward the earth in a frenzied motion. The plane dived crazily. Scarface, to give the devil his due, was an expert pilot. The mail ship circled and banked, with the diving ship beneath it. Then, her pilot deciding that help was needed, she thrust her nose toward the earth and commenced a plunge under full power to aid the apparently stricken ship.

Jimmy pushed his stick forward all the way, opened his throttle wide, and dove like a plummet after the two huge gray birds that raced each other toward the rocky terrain below. The wind flung itself viciously in his face, burning his eyes and lips. The struts rattled ominously, as the surging air whistled in his ears like a banshee's wail. Down and down he plunged. His roaring prop was a scant ten feet from the mail ship's undercarriage. He jammed down on his rudder bar and swerved to one side. He passed the Morgan plane with a scant two feet to spare.

Desperately he waved to the goggled pilot within. He saw the look of surprise that came over the other's face as he was recognized.

"Don't land. Go on!" screamed Jimmy, but his words were dashed into insignificance by the dominating staccato reverberations of the pounding engines.

The mail pilot cut his motor and waved a signal to Jimmy. The latter followed suit and yelled in the singing wind.

"Don't land. Go ahead. I'll go down."

The mail pilot looked at him wonderingly but the intensity stamped upon the boy's face banished any

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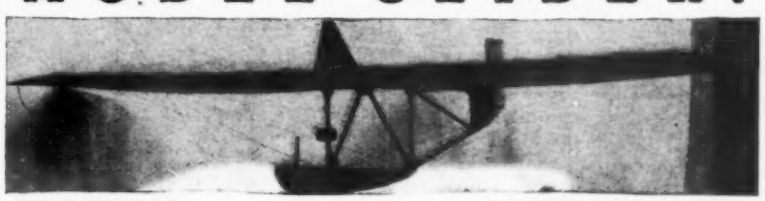

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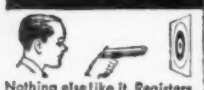

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thought he had of following the diving ship beneath them. With a shrug of his leather clad shoulders, he levelled out, pulled back on the stick and shot up and to the West once more.

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How to Build a Whittelsey Avro Avian

(*Continued from page 9*)

this is done, insert the propeller and shaft. Fill in with a piece of balsa and ambroid, smoothing off with sandpaper.

FINAL ASSEMBLY

Return to the wings. Use bamboo for the struts. Split it to the proper size and length. Ambroid in the necessary places and allow plenty of time to dry. For landing and flying wires, use white thread and small pins to hold them in place. With smooth sandpaper run over the whole plane and remove all ambroid spots and nicks.

The model is now ready for painting. Colors are optional. The model pictured here is painted with cream colored wings and fuselage. The center section and the top of the fuselage, starting in back of the motor, is blue. The motor cowling, spinner and propeller are silver. Landing gear struts are yellow. The vertical fin and horizontal stabilizer are cream yellow and the rudder, elevators and wing struts are blue. The lettering on the wings is in black and on the rudder in white. Use special colored dope.

Use a sharp pencil point to scratch out the ailerons, rudder, elevator and wing slot lines.

Necessary Materials

1 block	2"x 3"x 15"	balsa	fuselage
4 pieces	1/2"x 3"x 12"	balsa	wings
1 piece	1/4"x 3-1/2"x 12"	balsa	tail surfaces
3 strips	15" long	bamboo	landing gear, struts, etc.
1 block	1"x 1"x 1"	balsa	spinner
1 block	1"x 2"x 2-1/2"	balsa	center section
1 pair		celluloid, or Forest rubber wheels	
1 foot	No. 14	wire	landing gear
1 spool		white cotton	flying and landing wires
1 package	model making	pins	
2 strips	1/8" diameter x 12"	dowel	
1 2-oz. can		Unitite cement spec. colored dopes	painting

A Course in Airplane Designing

(Continued from page 32)

us at present are: first, that any body remains in a state of rest or of uniform motion until it is acted upon by some outside force, and, second, that for every force applied to an object there is an equal and opposite force set up.

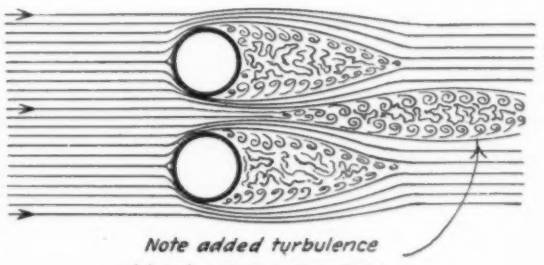
Let us apply these laws to the air, which we have already found to be a **definite** substance. First, if the air is at rest or in uniform motion, it will remain in that state until acted upon by some outside force. Second, if we apply an outside force to the air, thereby changing its position, the air will exert a force opposing the force that we apply.

That is the idea of the airplane.

If we can make a suitably shaped object and move it through the air, making the object force a large amount of air out of its place, we can make use of the opposing force of the air to sustain weight. The first experimenters in this line used a flat plate, set at an angle of attack. Then someone found that, if the plate were curved, there was much more lift produced.

Why does the curved wing have more lift than a flat one?

Figure 4



Note added turbulence which increases the drag

THE question is answered best by the physical properties of air. Air, being a fluid, tends to flow from regions of high pressure to regions of lower pressure. Again, from Newton's law we know that, once the air is set in motion in a certain direction, it will continue to move in that direction until it is acted upon by some force.

As we see in Figure 1, the air is deflected slightly upward by the entering edge of most wings. As it flows in this direction, it leaves a space just above the wing that does not receive any of the air stream. This causes a partial vacuum.

But the air is a fluid, and fluids flow toward regions of low pressure. Therefore the air is drawn downward, toward the wing, while the vacuum on the upper surface of the wing pulls upward, and lifts the wing. The vacuum on the top of the wing is the source of much of the wing's lift.

It must be understood that this explanation of the air flow about a wing section is purely theoretical. We have no way of watching the air move, but the above explanation has been proven satisfactory. It is accepted as correct, since it explains all of the observed characteristics of a wing.

Having arrived at some conclusions about the air flow about a wing section, we shall try to do the same for the air flow about a round object. In Figure 2, the air is deflected away from the object when it strikes it. With the air flowing away on both sides, the region directly behind the object is left as a partial vacuum, as we found above the wing section.

The air then is drawn in toward the vacuum. Some of it is pulled into the region, and there whirls around, with turbulence that increases with air speed. Any turbulence of the air uses up energy, energy that must be supplied by the airplane motor as it pulls the wing or other object through the air.

Whenever we have turbulence, or disturbed air flow, we have drag, that type of drag being called induced drag, to set it apart from other kinds of drag which we shall discuss later.

How shall we cut down induced drag? That should be easy, now that we know that it is caused by turbulence. Let us make the body of such a shape that there is no place for the turbulence, make it of such a shape that it fills the region of turbulence. Then, without much turbulence, there will be little induced drag.

Figure 3 shows a streamline, shaped so that the air flows around it smoothly and evenly, thereby reducing induced drag to a minimum. Here again, the diagrams are only approximate.

The air flows nearly in the manner shown at ordinary speeds, but at higher speeds there is turbulence behind even a streamline.

The small region of turbulence directly in front of the round body is a comparatively unimportant thing to us at present, but is shown to prove that the air breaks up into streams before it actually touches the body.

Now that we have some idea of

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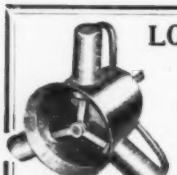

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the air flow around a single object, how will the air flow around two or more objects, placed near each other? We see in Figure 4 that there are not only the turbulent regions behind the objects themselves, but also there is an added disturbance that is caused by the deflected air streams striking each other.

This is called interference. It is a very important effect to consider when designing an airplane, because, if there is much interference, there will be so much drag that the ship will be inefficient.

Interference also exists between two objects placed at right angles to each other, such as a wing and the fuselage of a ship. This, however, is usually unavoidable, unless the wing is placed above the ship.

In the next article we are going to apply these principles of air flow to the complete airplane, as well as to its parts. We will find the explanation for many baffling actions of the airplane in the matter of air flow, and we will discuss such things as slipstream, downwash, and wing tip losses.

QUESTIONNAIRE

Now, before we leave this article, try yourself out on these questions:

1. How can we tell how the air flows about an object that we place in an air stream?
2. Does air have weight? Mass?
3. Explain the curved wing's superiority over a flat one.
4. What is induced drag?

Gliding and Soaring

(*Continued from page 8*)

you become uncertain as to what move you should make, keep your stick in neutral.

It is better to wear no goggles nor headcovering. You must learn to recognize currents of air by feeling them against your face.

ON several occasions a method of dual instruction, like that used in airplanes, has been employed to some extent. Dual instruction is carried on in a glider built for two passengers, with two sticks and two rudder-bars, which move simultaneously.

In such a ship, instructor and pupil can fly together, so that directions may be given in the air, and mistakes made by the pupil can be corrected by movements of the instructor's rudder-bar and stick. This method has two disadvantages: the additional weight of another passenger decreases the plane's efficiency unless a corresponding amount of wing area is added, and the student does not so soon learn to depend upon his own abilities.

You will, undoubtedly, enjoy your first flight. To control a glider gives one a feeling of mastery over the air rather than of ecstatic joy. Gliding is a quiet, graceful pleasure, and a reveling in one's high degree of skill.

Take-Offs. A glider must have speed, in order to rise from the ground. Since it has no power of its own, it must be launched in the air by some exterior force. The commonest method of launching a glider is by means of a shock-cord, or long rubber cable. This shock-cord works like a sling-shot.

The center of it is attached to the nose of the glider by means of a ring and hook. While the ship is held stationary by boys at the tail, the rest of the ground crew run forward, pulling on the ends of the shock-cord, and stretching out the rubber. At the command, the men at the tail let go their hold, and the glider is snapped into the air. This is called the catapult method of take-off and is the commonest. There are, of course, other methods.

Straight Flight. Straight flight means flight in a path which diverges neither to the right nor to the left. It does not mean horizontal flight, since the ship must glide downward in order not to lose speed. Straight flight is more difficult than you would expect, since the glider is inherently rather unstable, so you must know how to counteract its tendency to "fall off" to one side, or to yaw. Moreover, you must learn to what downward angle the glider flies most efficiently.

Stalls. A stall is the loss of flying speed. Flying speed means that forward velocity which is sufficient to allow the glider to maintain itself in the air and under full control. The glider pilot's first rule is, "Keep flying speed, fly fast!"

When the glider stalls, it loses altitude. Stalls, therefore, shorten the duration of the flight. At low altitudes, stalls are not dangerous, however, since the ship can be quickly brought out of them. The first thing to do when the glider threatens to stall is to push the stick forward. Eventually, the weight of the nose, which contains the pilot, and the lowering of the elevators, will force the glider into a dive, and speed will be regained.

Landings. In order to ground a glider, the pilot stalls the ship when it is within a foot or so of the ground. It then settles to earth. The landing stall is produced by pulling the stick gradually back, so that the ship comes out of the glide in a position parallel to the ground contour. Since the plane gains no additional speed under these conditions, its impetus is soon exhausted, and it will land gently.

IT is very difficult to give general rules for landing. Much depends upon the terrain. In the beginning, it is best to keep the stick nearly in neutral, or pushed somewhat forward. A stall, and the following abrupt fall to the ground, even if it is only one foot, should be avoided. Experience alone will give you the

skill necessary to enable you to ground the plane smoothly. But gliding, properly done, is not a dangerous sport.

Turns. A turn is a divergence to the left or right from a straight path of flight. To make a turn, both rudder and bank are necessary. The rudder swings the nose to the side to which you wish to turn. Bank is the tilting of the ship's wings, so that the wing tip nearest the center of the arc of the turn is lower than is the outer wing tip.

Bank is necessary to offset centrifugal force, just as it is necessary on a speedway to prevent an automobile from skidding when it goes around a corner.

It is the same principle which you unconsciously apply when riding a bicycle around a curve. You will need to practice turns a good deal before you will be able to use rudder and bank in proportion.

Dives and Climbs. Dives and climbs are not used in simple gliding. Their principal purpose (although they have a few other uses) is for flying from one current to another during soaring flight.

When the ship is gliding, it is at that angle to the horizon which will allow it to maintain flying speed; when it is diving, it is flying at an even sharper angle to the horizontal, in order that it may gather additional speed by its momentum.

A climb is the gaining of altitude by increasing the "angle of attack", that is, by raising the nose to a higher level than the tail. Just as an automobile can gain enough momentum by coasting down one hill, with its engine turned off, to go half way up the next hill, so a soarer can dive steeply from the height to which one air current has lifted it, then turn and climb into another air current.

Long Distance and Duration Flights. One of the greatest interests of soarer pilots at present is to set new records for long distance or duration. They are anxious, no doubt, to convince the public that the glider is of real practical value. Long distance flights are made by repeating continually the process of gaining height by means of one upward current, gathering momentum by diving, and climbing into another upward current. If the upward currents are prevalent, and the pilot is skilled enough to be able to recognize and make use of them, he may be able to traverse many miles of country.

Duration flights are normally made by circling about for hours over one strong upward current, or by flying back and forth along a ridge of mountain peaks where several strong upward currents are to be found.

As soon as you have acquired a little general knowledge of the procedure of the training which you are to be given, you are ready to assimilate more detailed information.

The subject of gliders is of maximum interest to model builders. As you will learn from the next instalment of this series, the great pioneers of aviation were model builders —they built models first, then they built gliders, which were merely enlargements of these models. Their actual experiments were made, of course, by building full-size gliders. The same thing is happening today. It may happen to you. By building glider models, you may hit upon an idea which will become an epochal development in aviation.

The August issue of* MODEL AIRPLANE NEWS *will be on all news stands July 23rd. Price 15 cents a copy.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912, of JUNIOR MECHANICS AND MODEL AIRPLANE NEWS, published monthly at Dunellen, N. J. for April 1, 1930.

State of New York } ss.
County of New York }

Before me, a Notary Public in and for the State and County aforesaid, personally appeared Capt. H. J. Loftus-Price who, having been duly sworn according to law, deposes and says that he is the editor of the JUNIOR MECHANICS AND MODEL AIRPLANE NEWS, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the foresaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business manager are: Publisher, Model Airplane News Publishing Co., 1926 Broadway, New York City; Editor, Capt. H. J. Loftus-Price, 148 West 78th St., New York City; Managing Editor, Edith L. Becker, 1316 Riverside Drive, New York City. Business Managers, none.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.) Model Airplane News Publishing Co., 1926 Broadway, New York City. Stockholder: Macfadden Publications, Inc., 1926 Broadway, New York City. Stockholders in Macfadden Publications, Inc., Bernarr Macfadden, Englewood, N. J.; O. J. Elder, 276 Harrison St., East Orange, N. J.

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5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is .....(This information is required from daily publications only.)

(Signed) H. J. LOFTUS-PRICE, Editor.

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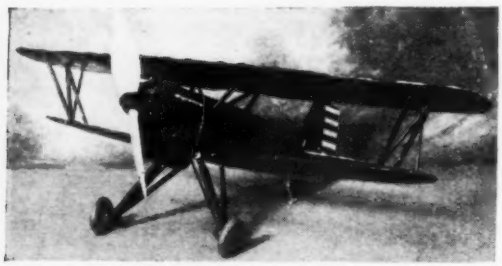

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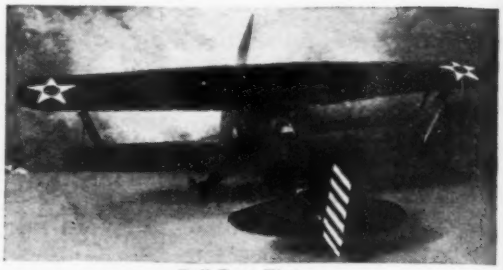

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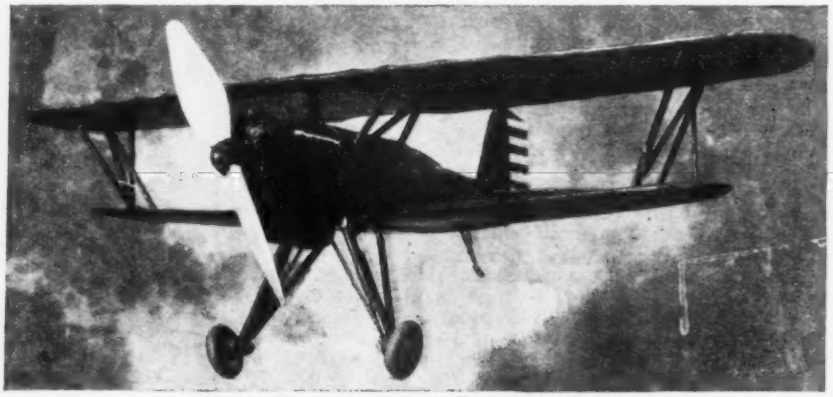

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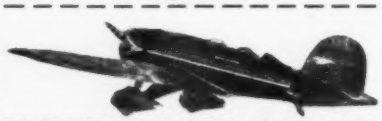

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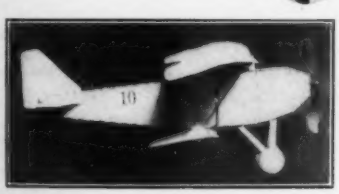

1 OUT OF 10

It is probable that not one model airplane set in ten has ever given its purchaser a satisfactory flight. Some of these failures have been due to carelessness on the part of the builder, some to the fact that the sets were too complicated for even an experienced builder to assemble, and some to the fact that so much needless material was put into the sets that the models were incapable of flight even when properly made.

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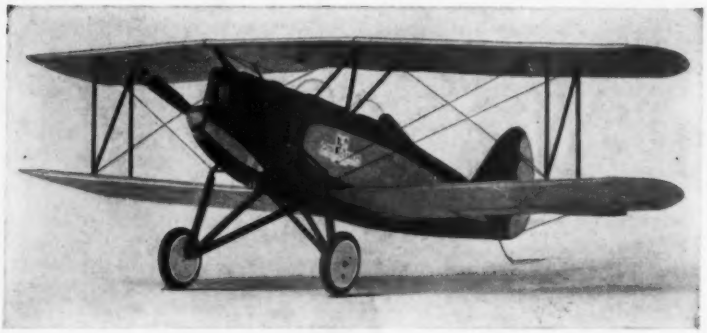
Insist on Cleveland

Designed Models



Cleveland Blue Diamond

The Mark of Quality

you may now buy your Cleveland Designed

GREAT LAKES SPORT TRAINER MODEL

on the Cleveland Time Payment Plan—$1.00 down, $1.00 each month

Surely you can save $1.00 by the first of each month or 3 1/3 cents per day. Send the down payment for your Great Lakes Sport Trainer Kit now. Insist on the kit stamped with the "Cleveland Blue Diamond," as there is only *one* Cleveland Designed Trainer model. We are sole manufacturers—*avoid the substitutes* that have disappointed many. Comparison with other kits is invited. (Complete description in May and June M. A. N.)

The News

regarding this entirely new kind of model kit is now attracting widespread attention. We are already shipping them to Canada and European countries. It's the topic of the day in practically every model circle and is bringing many recruits to the ranks of Model Aircraft Engineering as a new hobby. The following is an example: One eleven-year-old model enthusiast built three of our other models, the C-1, C-2, C-4, before the Trainer. "It went together easily," he said because the large drawing (which is sold for $4.00 separately but is included in each kit) gave him plenty of instructions for building, besides having all of the parts drawn full size. He is now a real model aircraft engineering enthusiast.

It would surprise one to see the quantity of orders coming in by mail every day—and there is a reason! Because the Cleveland Designed Trainers are such extremely fine models, and because they are so popular, we want to accommodate every purchaser who desires one. When your down payment is received, a Trainer Kit is laid aside for you until we have received payment for it in full, at which time it will be shipped to you immediately.

You Don't Have to Wait

until you have saved four dollars, ninety-five cents for the Trainer. Send $1.00 to start *now* and $1.00 the first of each month for four months, or until the total of $5.00 is paid. A five cent special service charge is made. You may send as much as you like and at any time, but the amount should not be less than $1.00 and not more than four or five months should be taken to pay for it. Send for yours immediately and have it paid for by Christmas as a present for yourself or a friend—or pay it up whenever you wish and get it right away.

Take Advantage of the Reduced Price

The regular price of $6.25 will go into effect shortly. If you send your down payment immediately, you take advantage of the low price.

Talk It Over With Mother and Dad

Let them know how you can buy a Trainer on the Cleveland Time Payment Plan. It will please them because they know it will teach you to save part of your allowance for the things you would like to buy. Tell them that since much expense and clerical work is involved we can not acknowledge receipt of each payment on the Cleveland Time Payment Plan and that we do not wish any cash payments (stamps not accepted), but P. O. or express money-orders or checks. Your stubs and our endorsement will be your receipt. The account will be closed when you receive your Trainer Kit. Payments are *not* returnable on purchaser's request. We only reserve the right to cancel any offer or order, refunding money for same.

Rapid delivery service to any part of the world. Orders shipped within six hours of receipt. Stamps and C. O. D. orders not accepted. GET A PENCIL—FILL IN THIS ORDER BLANK OR SEND A LETTER AND PRESERVE THIS PAGE.

Cleveland Model & Supply Company 7-30-N

Gentlemen: Enclosed find my check or money-order amounting to $ ..... for which ship the Great Lakes Trainer Kit Postpaid @ $4.95 $——
following items marked "X" immediately:
Down Payment on Trainer Kit..... ——
Model Kit No C-6 Postpaid ... @ 1.75 ——

SE-1——	SE- 7——	SE-13——	SE-19——
SE-2——	SE- 8——	SE-14——	SE-20——
SE-3——	SE- 9——	SE-15——	SE-21——
SE-4——	SE-10——	SE-16——	SE-22——
SE-5——	SE-11——	SE-17——	SE-23——
SE-6——	SE-12——	SE-18——	SE-24——

Drawings marked X above at $ .15 ——
6 Drawings marked X above for .80 ——
12 Drawings marked X above for 1.50 ——
24 Drawings marked X above for 3.00 ——
New Cleveland Catalog at .25 ——
Total— $——

I am clearly printing below my
NAME.....
ADDRESS.....
CITY..... STATE.....
Model Experience.....Years. Age.....Years

New Scale Outline Drawings

Start the new summer hobby—collecting drawings and data for fall and winter work. To help you, we now offer 24 of our popular standard scale outline drawings, of the full size popular commercial and military airplanes, which may be neatly bound together in our catalog and notebook. These drawings, you know, also contain photograhs (various views) of the airplane with full information on its Type, Class, Dimensions, Areas, Weights, Power-plant, Performance, and Construction (coloring when possible). The most complete drawings and the greatest drawing values ever offered anywhere. They even contain scales to which you may build your Scale Exhibition and Flying Models.

Order by numbers: *SE-1* Great Lakes Sport Trainer—*SE-2* Waco Taper Wing—*SE-3* Mohawk Pinto—*SE-4* Fokker Super Tri-motor—*SE-5* Fokker F-32—*SE-6* Sikorsky Amphibion—*SE-7* New 1930 Curtiss Hawk—*SE-8* Curtiss Falcon—*SE-9* Curtiss Condor Bomber—*SE-10* Lockheed Sirius (The plane in which Col. Lindbergh made the coast-to-coast record in less than 14½ hours.)—*SE-11* Ryan Brougham—*SE-12* Travel Air Mystery Ship—*SE-13* Boeing 95 Mail—*SE-14* Boeing 100 Sport Ship—*SE-15* Loening Amphibion—*SE-16* Keystone Patrician—*SE-17* Eaglerock Bullet—*SE-18* Eaglerock Biplane—*SE-19* Curtiss Robin-Challenger (The world's record endurance ship credited with 420 hours, equal to 17½ days, or over half a month)—*SE-20* Fokker Amphibion F-11-A—*SE-21* Ogden "Ospry" Tri-motor—*SE-22* Barling Monoplane—*SE-23* Vought Corsair—*SE-24* Ford Tri-motor.

The above drawings will be mailed anywhere at $0.15 each. Set of any 6—$0.80, any 12—$1.50 Postpaid.

P. S. Tell us what drawings you would like to have, whether planes, hangars, airport accessories, engines or other supplies, for we are your friends who want to help and serve you with the materials you desire.

The New C-6 A Sensation!! Have You Seen It?

A high climbing—long distance 24" all balsa twin pusher. It must be chased to keep it in sight. Get your kit for summer flying. $1.75 Postpaid. It's different from other twins and you're sure to have a good time with it.

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Contains complete information on the entire Cleveland Blue Diamond line and notes on model construction. Many new items listed. Additions will be mailed to you when printed. It is a binder for your Scale Outline drawings and data sheets—just what you have been waiting for! Price now $0.25. The 10c price for our catalog alone, is no longer in effect. The "deadline" was passed May 15, 1930.

Your data on models will not be complete until you have this incomparable catalog. Size 9" x 11½". Fawn colored paper cover, imitation Spanish leather, attractively printed in blue and orange.

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